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REVIEW OF SECTORAL CLUSTERS, SECOND PHASE: LAND, DESERTIFICATION, FORESTS AND BIODIVERSITY

Promoting sustainable agriculture and rural development

Report of the Secretary-General

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INTRODUCTION

1. The present report focuses on progress made in the implementation of the aims set out in chapter 14 of Agenda 21, 1/ entitled "Promoting sustainable agriculture and rural development", since the United Nations Conference on Environment and Development in June 1992, and puts forth a set of recommendations for action. This report was prepared by the Food and Agriculture Organization of the United Nations (FAO), as task manager for chapter 14 of Agenda 21, in consultation with the United Nations Secretariat, in accordance with arrangements agreed to by the Inter-Agency Committee on Sustainable Development at its fourth session (see document ACC/1994/17 and Corr.1). It is the result of consultation and information exchanges between designated focal points in various United Nations organizations, and international and national non-governmental organizations. This report contains information on countries based on national information available to FAO.

2. Prior to the holding of the United Nations Conference on Environment and Development, concern about the world's ability to feed the growing population without degrading the environment and natural resource bases had received increasingly wide attention. Exploring prospects for enhanced food security and nutrition and sustainability of agricultural and rural development were at the centre of United Nations system activities. These themes were the focus of FAO's report (1987) entitled Agriculture: Toward 2000 2/ and the World Commission on Environment and Development (Brundtland) Report (1987) Our Common Future. 3/ The FAO/Netherlands Conference on Agriculture and the Environment (held at 's-Hertogenbosch (Den Bosch, the Netherlands, 15-19 April 1991) emphasized these concerns with respect to sustainable agriculture and rural development (SARD) and identified major requirements for action at national and international levels for promoting SARD. In the Den Bosch Declaration on Sustainable Agriculture and Rural Development, 4/ adopted by the Conference, the Conference called for the attainment of three essential goals: (a) food security by ensuring an appropriate and sustainable balance between self-sufficiency and self-reliance; (b) employment- and income-generation in rural areas, particularly in order to eradicate poverty; and (c) natural resource conservation and environmental protection.

3. These goals were further elaborated as the blueprint for SARD in chapter 14 of Agenda 21. That chapter elaborated these goals into 12 interlinked programme areas: (a) agricultural policy review, planning, and integrated programming in the light of the multifunctional aspect of agriculture, particularly with regard to food security and sustainable development; (b) ensuring people's participation and promoting human resource development for sustainable agriculture and rural development; (c) improving farm production and farming systems through diversification of farm and non-farm employment and infrastructural development; (d) land-resource planning, information and education for agriculture; (e) land conservation and rehabilitation; (f) water for sustainable food production and rural development; (g) conservation and sustainable utilization of plant genetic resources for food and sustainable agriculture; (h) conservation and utilization of animal genetic resources for sustainable agriculture; (i) integrated pest management and control in agriculture; (j) sustainable plant nutrition to increase food production;

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(k) rural energy transition to enhance productivity; and (l) evaluation of the effects of ultraviolet (UVB) radiation on plants and animals caused by the depletion of the stratospheric ozone layer.

4. An inter-agency meeting held at FAO, Rome, in May 1993 identified the following major areas for increased cooperation and inter-agency collaboration in implementing SARD: databases including Geographical Information Systems (GIS); SARD policies; people's participation; trade, environment and agriculture; biodiversity; alternative agrochemicals; impact of climate change; and land degradation.

5. Agenda 21 has separate chapters on two of the programme areas of chapter 14: the integrated approach to the planning and management of land resources (chapter 10); and protection of the quality and supply of freshwater resources (chapter 18) on which a report was made for the second session of the Commission on Sustainable Development. Conservation of biological diversity (chapter 15), and managing fragile ecosystems: combating desertification and drought (chapter 12), are also related to some of chapter 14's programme areas. Hence reference to programme areas (d) and (f) is minimized in this report. Programme area (l), on ultraviolet radiation, now appears to be much less important for agriculture than was perceived at the time of the United Nations Conference on Environment and Development.

I. GENERAL OVERVIEW

A. Current situation

6. FAO's report Agriculture: Toward 2010 (AT 2010) (1993) 5/ shows that the rate of agricultural production growth at the global level has been about 2.3 per cent between 1970 and 1990 and thus has exceeded population growth so that per capita supplies of food have increased. However, wide regional disparities remain: the situation improved greatly in East Asia but worsened in sub-Saharan Africa. There still remain large numbers of under-nourished people in developing countries; the figure is estimated at about 780 million, or 20 per cent of their population. The relentless exploitation of the natural resource base to achieve an increased level of agricultural production has resulted in increased natural resource scarcity and environmental degradation.

7. The future food security scenario projected by AT 2010 indicates that by the year 2010, when global population will have reached about 7.3 billion, per capita food supplies will continue to increase and the incidence of undernutrition will slowly decline in most developing regions. However, parts of South Asia may still face difficulties and much of sub-Saharan Africa will probably not be better off than at present. 6/ The numbers of people suffering from chronic undernutrition will remain unacceptably high, at between 600 and 650 million. Furthermore, per capita availability of arable land is projected to nearly halve between the late 1980s and 2010, with the figure going from 0.65 to about 0.4 hectares (ha). This projection underlines the fact that pressure on agricultural resources and the environment will continue. It reinforces the fact that there is an urgent need to so promote the sustainable intensification

of agriculture as to enhance food security (while minimizing the encroachment on fragile and forested land) and protect the environment.

8. Achieving SARD is a slow-moving wide-frontier process and has to be promoted accordingly through a wide range of various social, economic and technological means. An overall assessment of the efforts carried out in developed and developing countries, and economies in transition, and by various international and local organizations, including non-governmental organizations, shows a better understanding of SARD concepts and the links between them. However, that understanding remains incomplete and there remain tensions caused by the different perspectives of SARD held by Governments, communities and people. The challenge still lies in reconciling these different views and in discovering how to make better use of improved understanding and of experience gained to achieve SARD objectives, for which a broad consensus exists.

B. Overall assessment of progress in different sustainable agriculture and rural development (SARD) programme areas

9. In the area of agricultural policy review and reform, there are efforts being made to obtain a better understanding of how to integrate environmental issues into agricultural policy and planning and to assess the links between trade and the environment, those links constituting an important consideration given the potential impulse to food and agricultural trade flows arising from the conclusion of the Uruguay Round of multilateral trade negotiations. In developed countries, in the area of agricultural policy reform, there is an increasing tendency to integrate environmental concerns into agricultural policies as well as concern regarding the impacts of trade and environmental measures on agriculture. Developing countries are beginning to address environmental problems relating to food and agriculture. Efforts include the preparation of environmental action plans and the setting up of environmental institutions with the help of the World Bank, the United Nations Environment Programme (UNEP) and other United Nations bodies. Countries in transition are in the process of restructuring their agricultural sectors and developing market mechanisms. However, although there have been significant advances in agricultural and environmental policy reform, only a few countries have developed an integrated national policy for SARD.

10. People's participation is fundamental to SARD. The issues being negotiated between Governments and farmers' organizations in developed countries increasingly involve environmental concerns. Participatory programmes are emerging. Several organizations are promoting people's participation through various programmes in developing countries. The role of non-governmental organizations has been significant in enhancing people's participation at the field or project level. Multinational lending agencies are also promoting local participation and other forms of communal organization in the management of natural resources that cannot, or should not, be privatized.

11. Efforts for improving farm production and farming systems are being carried out through various farmer-centred programmes. Non-governmental organizations have been particularly active in this area. FAO is undertaking collaborative efforts to promote SARD through analysis and relief of constraints to

sustainable agriculture at the farm level. Some countries in Asia are launching Farmer-centred Agricultural Resources Management (FARM) activities with support from United Nations organizations. Farmers and communities have demonstrated increased food production using resource-conserving technologies that minimize the use of external inputs.

12. In the area of land and water conservation and rehabilitation, there is widespread agreement that the Polluter Pays Principle should apply, although its application in agriculture raises a number of difficulties and its actual use is limited. In developing countries, the task of conserving and rehabilitating land and other natural resources is being increasingly shared by the central Government and local communities. The newly signed United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (A/49/84/Add.2, annex, appendix II) will assist in combating dryland degradation.

13. In order to meet the objective of water for sustainable food production and rural development, national action programmes are being formulated and implemented in various countries of Asia and Africa. These action programmes aim at increasing water use efficiency, water-supply to rural areas, control of waterlogging and salinity problems, and scarce water resources management, as well as inland fisheries and aquaculture development. Inter-agency work is proceeding on how to implement the joint and integrated management of land and water resources. The necessary policy and legal instruments to achieve this may not exist and practical experience suggests that incisive government intervention may be required.

14. In the area of conservation and utilization of plant and animal genetic resources, countries are negotiating, through the intergovernmental Commission on Plant Genetic Resources (PGR), the revision of the International Undertaking on Plant Genetic Resources for Agriculture (PGRFA) in line with the Convention on Biological Diversity, 7/ including seeking consensus on matters left outstanding by the Convention: access to existing ex situ collections and realization of farmers' rights. The Global System for the Conservation and Sustainable Use of Plant Genetic Resources for Food and Sustainable Agriculture is being strengthened, including the acceleration of the development of the global information and early warning system, and networks for the conservation of PGRFA. The first stages of an assessment of the world's PGR and the Global Plan of Action on PGR are being prepared for the Fourth International Technical Conference on Plant Genetic Resources planned for 1996. A decision also has been made regarding the placing of ex situ collections of plant genetic resources in the International Agricultural Research Centres (IARC) genebanks, under the auspices of FAO. A world watch list of endangered domestic animal species has been published. Intergovernmental discussions are under way to expand the mandate of the Commission on PGR to include animal genetic resources. A global strategy on the conservation of animal genetic resources is being designed.

15. There has been considerable progress in the area of integrated pest management and related action on pesticides. Responding to consumer pressures, developed countries are taking new initiatives to reduce the use of pesticides and are taking measures to limit trade in hazardous pesticides, through adoption

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of the prior informed consent (PIC) procedure. In developing countries, farmer-centred integrated pest management (IPM) projects are being carried out, particularly in Asia. There is improved collaboration among international agencies in promoting IPM and innovative financing mechanisms. Use of biopesticides and biocontrol methods is being promoted. Institutions within the Consultative Group on International Agricultural Research (CGIAR) are also taking new initiatives to promote research on IPM-related subjects.

16. In the area of sustainable management of plant nutrition to increase food production, CGIAR centres are carrying out some research activities. FAO has responded to Agenda 21 proposals by reorienting the focus of its former fertilizer programme towards an integrated, plant nutrient approach. Some countries have already made efforts to promote integrated plant nutrient systems based on a comprehensive approach involving farmers, extension services, private enterprises and farmers' organizations. Also, research is being focused to demonstrate the benefit of the combined use of mineral, biological and organic sources of plant nutrients.

17. In the area of promoting rural energy to enhance productivity, new policies and technological options are being pursued by many countries, both industrialized and developing ones. The thrust is towards enhanced energy efficiency and the promotion of renewable sources of energy, and this is setting energy and environmental links within a new context. Among the fields of renewed interest is biomass energy conversion which offers energy, environment, employment and economic benefits. However, only a few feasibility studies have been carried out on the potential exploitation of wind and solar energy in rural areas for promoting energy to enhance productivity. In a majority of cases, they have not yet proved to be competitive given the low level of real prices for fossil fuels.

18. In the area of evaluation of the effects of ultraviolet radiation on plants and animals, the impacts of such radiation on agriculture do not appear to justify action separate from that already embraced by the Montreal Protocol on Substances that Deplete the Ozone Layer. 8/ The use of methyl bromide (an ozone-depleting substance) as fumigant for soils and food products will be phased out by the year 2000.

C. Major issues and identified gaps

19. Major issues differ in each group of countries. However, the conventional external-input-intensive, trade-driven agricultural development model still dominates government, donor and funding agency policy. In many developed countries, the policy approaches to promoting SARD are being explored. Although integrated rural development policies are being implemented in some developed countries, there is often a lack of an overall coherent policy promoting SARD. The process of reforming agricultural policies, including the Common Agricultural Policy of the European Union, will have some positive effect on the use of resources for farming in more environment-friendly ways and for the production of environmental public goods, but will require specifically targeted policies and legal measures. Progress in implementing SARD in developing countries is similarly uneven, mainly because the widespread existence of

poverty is linked to environmental degradation, and the lack of a constituency of consumers with regard to food and the environment, as well as institutional weaknesses. The continued burden of external debt continues to constrain government interventions including those designed to promote SARD initiatives, while the pressing needs to service debt are claimed to underlie continued natural resource-based exports based on unsustainable practices. Countries in transition face similar challenges. Though their physical infrastructures, compared with those of developing countries, are largely in place, agrarian structures and low prices for farm products are barriers to introducing SARD policies in the short term. In all countries, the integration of SARD policies with supportive economy-wide policies still face serious challenges. Fully coherent packages of policies and their related measures, designed to meet the diverse objectives of a SARD-based strategy, are also uncommon.

20. There has been an inadequate coalition built among Governments, the donor community, development agencies and sources of foreign direct investment (FDI) to tackle the poverty-environment links. There also have been failures to address the environmental problems often associated with rapid and uncontrolled agricultural commercialization: habitat destruction and resource degradation. Owing to misconceived sectorally oriented policies, top-down approaches and the vested interests of people in power, the call for an integrated and bottom up approach has been neglected. Likewise, continuously changing development policies of international development agencies and internationally imposed policies have contributed to the marginalization of the poor and particularly women farmers.

21. The issue of poverty-environment links in the third world is perceived by some observers to be closely related also to international trade policies. They argue that Northern trade policies undermine the prospects for sustainable agriculture in developing countries in a number of ways, notably through the short-term promotion of food and agricultural exports from the South and a diversion of support to domestic policies aimed at achieving food security.

22. The agricultural sectors are being increasingly integrated into domestic and international markets. Many analyses are under way on the impact of the Uruguay Round Agreement on Agriculture which generally shows that there will be some improvement in the allocation of resources and a better trading environment for agricultural commodities. In association with domestic agricultural policy reforms, these developments will contribute to promoting SARD. However, the potential impacts of the Uruguay Round on subsistence-level farming, the existence of poor people and environmentally fragile marginal areas, which are among the major factors in unsustainable agriculture, are yet to be measured. The conclusion of the Uruguay Round has underlined the need to place world trade on an environmentally sound basis, particularly through the effecting of a better reflection of environmental costs in the prices of traded goods.

23. Intellectual property rights have evolved in certain legal and cultural contexts and as such are either totally alien to certain cultures or inaccessible to informal innovators. Under this system protection of indigenous knowledge would be difficult and might be alien to those cultures. This shortcoming can lead to abuse and must be addressed.

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24. The increased effects of the use of chemical inputs, particularly pesticides, on the health of agricultural workers and on public health as well as on the environment in general, are other major areas of concern with respect to promoting SARD. The World Health Organization (WHO) estimates that between 3.5 and 5 million people a year are poisoned by pesticides (40,000 fatally), primarily in developing countries. In the case of some developing countries, these are only local problems because the overall use of such chemicals is low although increasing. More international attention is required to ensure the safe management of agricultural chemicals including the use of less harmful chemicals and alternative pest control measures. This issue also highlights the fact that a different emphasis should be placed on those chemicals that pose direct threats to human health, such as certain pesticides, in contrast with those, such as plant nutrients, that do not, in terms of regulating their use.

25. The problem of soil erosion is widespread as demonstrated by the UNEP/International Soil Reference and Information Centre (ISRIC) World Map of Human-induced Soil Degradation, but its effects tend to be more severe in the developing countries. In the developed world, correcting for soil nutrient depletion from erosion through excessive applications of mineral fertilizers may contribute to contamination of soil and water sources. Such problems are being addressed through the adoption of plant nutrient management and more comprehensive ecological farming methods. The difficulty in determining market values impedes conservation efforts by making it difficult to estimate opportunity costs and maintenance costs for rehabilitation efforts. A study undertaken by the Winand Staring Centre in the Netherlands with FAO support has shown that in sub-Saharan Africa, the generally low-level intensiveness of fertilizer use may lead to soil nutrient depletion becoming a major issue, rather than pollution.

26. There is need for greater efforts for resource conservation and rehabilitation at the field level to reduce soil degradation problems. On the management of fertilizer inputs which are necessary for effective plant nutrition in an environment-friendly manner, constraints are also imposed owing to (a) the inability of fertilizer industries, which are frequently within the public sector, to respond adequately to new orientations in the market for fertilizers; (b) the lack of reliable information on demand and supply of nitrogen, phosphate and potash; and (c) the lack of up-to-date and reliable crop/nutrient response curves, adapted to different management levels and to agronomic policy and economic conditions.

27. Progress in promoting off-farm employment - a SARD strategy component important in reducing direct pressure on land and ensuring sufficient opportunities for earning a living - has been slow in many countries mainly because of misconceived past industrialization policies that failed to integrate agriculture into the process. Continuing economic problems relating to the burden of external debt and, in most recent years, widespread recession, have also contributed to this problem. Similarly, although urbanization can act as an engine for agricultural development and hence provide an incentive for a sustainable agriculture, it has frequently been so rapid as to lead to widespread urban poverty and a deteriorating urban environment; it has depleted agriculture's supply of labour without providing a growing market for food or a flow of remittances. The fault may lie less with urbanization policies, or the

lack of them, than with development strategies that fail to provide the incentive for a productive agriculture or services to rural areas. In other countries - notably many of those of the Organisation for Economic Cooperation and Development (OECD) - there has been an increase in rural, non-agricultural employment, which has partly offset the decline within agriculture. Future rationalization of agricultural production will create a continued need for policies encouraging the development of rural off-farm employment.

28. Little progress has been made in channelling financial resources towards the promoting of SARD. The Global Environment Facility (GEF) is not directly oriented towards SARD. The relative success of IPM programmes in attracting funding underlines the importance of having a defined strategy and fundable projects. Financial constraints remain in most developing countries which are still dependent on financial support from the donor community. The potential for developing financing mechanisms for sustainable development through innovative ways of generating revenue have not yet been well explored. The challenge remains of adopting both suitable economy-wide and sectoral policies that provide an incentive for the mass of small-scale farmers to invest in conservation and sustainable use of natural resources, and sustainable agricultural practices, while expanding production.

29. While international attention has been focused on the erosion of plant genetic resources and while there have been institutional developments to facilitate remedial action, particularly through the FAO Commission on Plant Genetic Resources and the International Plant Genetics Resources Institute (IPGRI), similar progress has not been achieved in animal genetic resources. Yet the strong trend towards developing and utilizing globally an increasingly smaller number of animal genetic resources in modern agriculture poses a serious threat to the remaining resources of domesticated species. This area merits institutional development, similar to that achieved in the area of plants.

II. REVIEW OF PROGRESS ACHIEVED, MAIN POLICY ISSUES AND EXPERIENCE

A. Country experiences

1. Developed countries

(a) Overall progress review

30. For most developed countries, pressure for reforming agricultural policies has arisen through the recently concluded negotiations of the Uruguay Round of multilateral trade negotiations which started some years prior to the United Nations Conference on Environment and Development. Additional factors were rising budget costs of support policies and the aim of allowing market signals to have a greater influence on production decisions. Within this process, the OECD approach of regular "peer reviews" of member countries' agricultural policies, involving the estimation of such indicators as producer and consumer subsidy equivalents (PSE/CSE), was useful. The result has been a move towards the decoupling of farm support from production, production controls and land set-aside programmes, together with reduced levels of protection and export

subsidies that have led to reduced producer price levels. This policy change has been accompanied by a reinforcement of integrated rural policies directed to all sectors of the rural economy. In some countries consumer pressure is also mounting in support of organic food production. It may be discerned that since the United Nations Conference on Environment and Development, there have been more moves towards making the promotion of more efficient agricultural markets, both domestic and international, compatible with the goals of conserving natural resources and protecting the environment.

31. Among Western European countries, Germany recently emphasized ecologically sustainable agricultural production and the United Kingdom of Great Britain and Northern Ireland submitted a plan to the European Union for implementing agri-environmental regulation. The United Kingdom plan includes measures for expanding environment- and nitrate-sensitive areas. The Netherlands rearranged its institutional structure at the ministerial level in order to give specific attention to the management of natural resources. Austria has reoriented its economic policies under the rubric of "eco-social-market policies" in order to maintain services provided by farmers in disadvantaged areas and to improve environmental performance in abating natural hazards and erosion, and promoting diversified land use and soil quality. Likewise, Norway has strengthened environmental measures. Sweden introduced an agricultural reform bill in 1992 which set forth environmental goals to safeguard landscapes, to preserve the natural and cultural values of the environment and to minimize the negative impacts of agricultural chemicals. In Switzerland, the federal authorities introduced economic incentives in 1993 to promote ecological farming.

32. The Japanese Government introduced a new agricultural policy in June 1992 in order to promote environmentally sound agriculture.

33. In the area of soil and land conservation, OECD produced a report on "Public Policies for the Protection of Soil Resources" in 1994 that presented the findings of a two-year project on sustainable soil and land management. It addressed soil erosion problems induced by human activities, soil pollution by chemicals, soil salinization, afforestation and the management of semi-arid lands.

34. In the United States of America, recent legislation, building on the Sustainable Agriculture Adjustment Act of 1989, is designed to enable farmers to adopt resource conservation techniques. Efforts are intensifying to incorporate environmental issues more fully into the 1995 farm bill including a modelling of the environmental impacts of its policy options.

35. Australia has expanded its National Landcare Programme to integrate the efforts of government (national and state), individuals and communities in responding to land degradation. A feature of this Programme has been its participatory nature with communities forming groups of farmers that plan and implement their own land use and conservation projects.

36. In the area of people's participation, agricultural organizations are being considered partners by the governments of the Western European countries in the elaboration and implementation of agricultural policies, including direct income support and production control measures. These have become closely associated

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with environmental measures. Implementation of agro-environmental programmes is largely decentralized at the community level and based on the voluntary and contractual participation of farmers. These programmes also focus on the diversification of land use and off-farm activities and include organic farming and non-food uses of the land. For example, in Norway, the Farmers' Union has adopted a policy emphasizing the sound stewardship of land and other natural resources.

37. As regards the use of pesticides, various measures, such as national pesticide reduction plans where reduction of 50 per cent within five to ten years is being planned and achieved, control of pesticide residues, provision of training in the use of pesticides and regular control of pesticide application equipment are being implemented. Other measures support the purchase of more efficient application equipment, introducing specific rules on selling phytosanitary products, and the research, development and wider use of alternatives to chemical pest control, including biological control agents and pest-resistant varieties. However, recent reductions achieved in the volume of pesticides used may be due as much to the increasing activity of the ingredients as to genuine reductions in use.

38. In the United States, all previously approved pesticides are being re-evaluated and a number of them have been taken off the market or have had their acceptable residue levels reduced.

39. Developed countries are also taking a more active role in implementing management-related activities in PGRFA. Most of these have started the process of preparing activities which will become part of Global Plan of Action. Progress in developing strategies for in situ conservation has been relatively slow, however.

40. In the area of rural energy, some developed countries have introduced a series of production, price and taxation policies to promote the "decentralized" production of power with renewable energies (wind, solar, biomass). This has opened up possibilities for new energy markets of potential benefit to rural areas that are becoming energy producers (namely those having, for example, sugar, rice and groundnut mills; large livestock farms; wind "farms"; and photovoltaic (PV) installations).

(b) Major issues and challenges

41. Some developed country Governments have expressed difficulty in applying the goals of chapter 14's programme areas to their particular situations. This may reflect the fact that most have yet to begin strategic planning for implementing a SARD strategy. There is still a lack of fully coherent packages of policy measures combining those affecting farmers' decisions on farm practices with those on training, extension services, provision of credit and so on that are needed to move towards SARD. There is also a need for greater involvement of local communities and non-governmental organizations in formulating and implementing SARD programmes.

42. In past decades, developed countries have achieved considerable success in food and agriculture but in a rather narrow range of objectives of expanding

output and enabling farm incomes to match those in non-agricultural sectors. However, this has been achieved at the cost of much environmental damage. The challenge, therefore, is to balance farm production/income goals with environmental protection in essentially market-driven economic settings.

43. There has been a high degree of reliance on market forces in promoting agricultural production. However, can market forces (a) set an agricultural research agenda that though increasingly dominated by private commercial interests is oriented towards developing sustainable technologies, and (b) exert demand pressure for organic products so as to promote a significant shift towards more environment-friendly production practices?

44. There is a need for sufficient political support for the more visible "decoupled" income transfers in order to compensate for output losses arising from more environment-friendly practices and for land set-aside programmes.

2. Developing countries

(a) Overall progress review

45. The government priority in the majority of developing countries is to increase food production to meet the demand of growing populations. In line with this approach to food security, pricing policies for food items and farm inputs were designed to provide incentives to farmers as well as to keep food prices within the reach of consumers, particularly urban ones. In addition, programmes were established, often with the assistance of external donors, in research, extension and training, and marketing and distribution of agricultural products, to promote the use of modern technologies.

46. Review of economy-wide and sectoral policies in line with SARD has yet to be carried out in most of these countries. Domestic pressure for quality food products is rarely present although external pressures are being exerted, through international trade. A few developing countries have prepared National Environmental Action Plans (NEAPs) with technical support from the World Bank, UNEP and the United Nations Development Programme (UNDP). NEAPs focus on the resource base but also include such topics as integrated management of soil, water and plant nutrition, training on integrated pest management, monitoring and training for sustainable agriculture and agro-environmental protection activities at the field level. Though these NEAPs are in most cases lists of priority areas and do not necessarily integrate environmental policies into economic planning, they have contributed to a better understanding of the needs for addressing environmental problems at the national level.

47. At the sectoral level, some countries have started to address the matter of policies for increasing the efficient use of land and water resources mainly on the side of demand. Demand management policies for water include pricing of the resource, increasing on-farm system efficiency of water use, and developing water markets where possible.

48. The Farming Systems Development (FSD) approach has been accepted and widely applied in several developing countries. In Eastern and Southern Africa, for

example, FSD features prominently now in Kenya, the United Republic of Tanzania, Zambia and Botswana, and this has been achieved through FSD-awareness programmes for decision makers, human resources development programmes, and networking. In the Sudano-Sahelian region of West Africa (the Niger, Benin, Burkina Faso, Senegal), a new generation of sustainable resources management projects are increasingly using a comprehensive FSD approach. In Benin, the RAMR (Recherche agronomique en milieu réel) project aims to improve the technological transfer process, and PEMR (Poursuite des études en milieu Réel) advocates improving farmers' participation in rural development. In Latin America, more comprehensive systems are being launched to promote FSD, particularly in marginal areas in Peru, Ecuador and Brazil, with the aim of promoting participatory rural development.

49. In Asia, the FARM programme for sustainable agriculture has been launched to support the implementation of Agenda 21 in China, India, Indonesia, Nepal, the Philippines, Sri Lanka, Thailand and Viet Nam. The programme is targeted at resource-poor communities and farm households, with an overall objective of improved conservation, management and utilization of natural resources in rain-fed lowlands and uplands.

50. The UNDP-initiated programme on Sustainable Agriculture Networking and Extension (SANE) aims to enhance capacity-building and human resources development in the area of sustainable agriculture through agro-ecological training, participatory research, policy advocacy and information networking among non-governmental organizations and other national/international organizations in Asia, Africa and Latin America.

51. At the local level, the Group Farming Initiative of the Kerala state Government in India presents a good example of how coordinated action can have a significant impact on farming practice. Local communities comprising all rice farmers were established for group activities, such as water management and labour mobilization.

52. In the area of agricultural chemicals, pesticide registration information in developing countries of Asia has been recently compiled. Indonesia and the Philippines (both in rice) and Brazil (in soy beans) have already implemented IPM programmes. FAO is supporting IPM programmes in rice, vegetables and citrus fruits in South-East Asia and start-up studies on sorghum and millet in Africa. Together, these programmes are training many thousands of farmers and have saved many millions of dollars in costs of pesticides: pesticide use has been halved in Indonesia since 1987, largely because of the IPM rice programme, coupled with a phasing-out of pesticide subsidies.

53. In China as part of its national Agenda 21, agricultural policy is encouraging farmers to grow green manure in rice fields: green manures and plant residues are now used on two thirds of its rice area. Chinese Ecological Agriculture (CEA) is an approach to agricultural management guided by the principles of ecology and economics. It combines both indigenous and modern technologies with maximum recycling of wastes generated in the production and consumption processes. Likewise, use of green manure and cover crops in Central America and Brazil has transformed farming practices in recent years. Cuba has introduced an "Alternative Agricultural Model" which focuses on technologies

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that substitute for external inputs, such as IPM (to replace pesticides). Namibia has produced a Green Plan that strongly advocates the preparation of a national action plan to implement sustainable development.

54. As regards land conservation and rehabilitation, efforts made so far by international, national and local agencies in developing countries are - compared with the magnitude of this problem - inadequate. It is becoming clear that conservation and rehabilitation activities can be carried out at a reasonable price and over large areas only through the activities of land users themselves, either as individuals or in groups. This is resulting in a move away from Governments' trying to carry out large-scale soil conservation projects themselves. A recent longitudinal study, funded by the World Bank, the United Kingdom Overseas Development Administration and the Rockefeller Foundation, of the Machakos District in Kenya, has improved understanding of this process. During a period of 60 years, the district's population increased fivefold, and average output per unit of land rose almost tenfold, while environmental conditions measurably improved largely through the autonomous undertaking of erosion control measures by the farmers themselves. In some countries, such as the Niger and Burkina Faso, efforts are being made to develop soil and water conservation practices, based on traditional technologies, which do not require the use of heavy equipment or expensive inputs.

55. SARD is also closely related to the matter of the security of land tenure. Even given the fact that insecure tenant farmers and sharecroppers may have little incentive to invest in measures designed to enhance land productivity in the long term, there has been little apparent progress in addressing this problem. The Gambia has begun to study the impact of land tenure on natural resources management and Zimbabwe has established a high-level committee to formulate land tenure strategies.

56. Progress on conservation and sustainable utilization of PGRFA in developing countries is mixed. A few countries - Brazil, China and India - have established national programmes and mechanisms for conserving and utilizing PGRFA. Since the United Nations Conference on Environment and Development these national programmes have begun to implement the activities listed in Agenda 21. In contrast, a number of least developed countries and many island countries have no specific programmes on PGRFA. Some have national facilities but often these are underfinanced and understaffed.

57. Several countries have created and consolidated cooperation networks on the exchange, management and conservation of plant genetic resources, closely linked to the use of new technologies. Most of the efforts have been made in plant rather than in animal or micro-organism genetic resources, however. Scientific guidelines and manuals are now available for defining scientific and operational concepts for implementing biosafety systems.

58. A sustainable rural energy supply and transition to enhanced agricultural productivity remain a major issue in developing countries. Although some progress has been made in the utilization of some renewable forms of energy (wind, solar, biomass), low prices, and especially the subsidies provided to fossil fuels, continue to hamper their application.

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(b) Major issues and challenges

59. Most developing countries are under pressure from numerous sources to review agricultural policies, plans and programmes, both economy-wide and sectoral ones, with respect to their implications for the sustainability of economic development and the achieving of food security. Those sources of pressure include the conditionalities imposed by lending institutions, as part of stabilization and structural adjustment programmes, as well as the follow-up to the United Nations Conference on Environment and Development, the seeking of more effective government input into the provision of food security and more rapid economic growth. Trade-offs between economic growth and environmental protection, or between reducing poverty and conserving natural resources, if stated in an overly simple manner, can pose serious policy and political dilemmas for developing countries. They typically possess limited institutional and human resource capacity to assess the implications for sustainable agricultural and rural development of ongoing developmental plans. Such countries find their limited capacities further extended by multiple, overlapping and uncoordinated requests for environmental and sustainable development plans and their analyses. Experience shows that response to external demands often result in top-down, non-participatory actions with too much emphasis on the plan as a document and too little on its entailing a process that will result in changed attitudes towards the shifting of agricultural and rural development onto a sustainable path.

60. Insufficient capacity to review economy-wide and sectoral policies, due to data- and institution-related limitations as well as the lack of political commitment, characterizes many developing countries and has limited progress in achieving SARD. The links among the incidence of poverty, the dynamics of population growth and migration and environmental degradation are not well understood. Three types of conceptual and empirical knowledge are required about agricultural, environmental and economic systems. These involve:

(a) A better understanding of biophysical relationships that allow quantification of, for example, the effect on yields of a given level of soil erosion or changes in climate, or the effects on the natural resource base of particular agricultural practices. Such quantifiable cause-and-effect relationships are necessary in order to calculate costs and benefits of alternative actions;

(b) The establishment of appropriate (efficiency or social) prices or values for environmental goods and services produced and consumed and for natural resources stocks. For some of these, reasonably efficient and competitive markets provide usable prices. However, for many environmental goods and services either markets do not exist or existing markets are imperfect (so that market prices either are not available or do not reflect true social values). There is thus a need to develop markets, to remove any impediments to their development, and to so price resources and production as to reflect those social values, thereby internalizing externalities. However, where markets do not exist, there arises the problem of the valuation of environmental benefits, as a basis for any policy intervention and evaluation. This also underlines the issue of intellectual property rights as they relate to the rights of farmers with respect to genetic resources;

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(c) In areas where market-based instruments cannot provide economic incentives, such as that of subsistence-level farming, there is a need to identify resource use and management alternatives to relieve the pressure on marginal areas. Creation of physical infrastructures will gradually help to introduce market-based policies, but there is a danger of further resource depletion and environmental degradation before the introduction of such mechanisms is fully achieved. In such areas, identification of local needs, clear definition of property rights, development of indigenous technologies and enhancing of participation of the local people are necessary. These efforts are being retarded mainly by widespread ignorance of local people's knowledge of these issues.

61. Another major gap is the current weak institutional status in a variety of areas. Firstly, current institutional arrangements for promoting sustainable agriculture are largely project-based. This means that progress has been weak in the overall policy area, and it has also been weak in the building of viable institutions that can provide continuity and adequate support to the efforts made. In addition, there is often a lack of a strong political commitment to making the transition to sustainable agriculture and rural development, so as to safeguard the environment and eradicate poverty. In most countries the existing bureaucratic structure is inefficient or not well structured and incapable of tackling deep-seated social problems relating to more equitable access to land and other assets and the status of women. Finally, in the area of food trade, non-tariff barriers are becoming increasingly important, reflecting rising health and environmental concerns in developed country markets. Responding to legislation such as the prior informed consent (PIC) procedure and the Codex Alimentarius places additional demands on developing country institutions in meeting the requirements for setting and monitoring food-quality and packaging standards.

3. Countries in transition

(a) Overall progress review

62. The countries with economies in transition are exposed to the same pressures and constraints as both developed and developing countries. In particular, they currently confront major industrial or "brown" pollution problems, together with the effects of radical changes in economic systems that have completely altered input-output price relationships, including those for agriculture. Environmental factors related to agriculture are largely being overshadowed by basic problems such as land reform, farm restructuring, input supply, improvement of production and productivity, and pricing. There are still geographical areas where the overriding environmental issue is the radionuclide contamination caused by the Chernobyl accident of 1986. Nevertheless, these countries are moving towards a process of agricultural reform, including the adoption of measures directly related to rational use of natural resources and environmental issues and the protection of water and soils. Policies aimed at taking marginal lands out of production are being introduced. Another consideration is the sharp reduction for economic reasons in the use of fertilizers, plant protection chemicals and energy.

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63. In the Czech Republic, the policy objective is to combine sufficient yields with environmental protection. In order to reduce surpluses together with the intensive use of land, measures have been taken to withdraw land from cultivation and turn it into meadow or woodland. Poland has prepared a programme entitled "Pro-ecological Orientation in Agricultural Policy in the Twentieth and Twenty-first Centuries". In the Russian Federation, as a result of agrarian reform, 60 per cent of the cropland has been brought into new forms of agricultural enterprises. The Russian Government also adopted a decision on the functioning of the agro-industrial complex of the Russian Federation for 1994 to keep the economic incentives given to producers in 1993. In Romania, the modernization and restructuring of the whole agro-food sector is taking place with the stated aim of strengthening food security. Though these measures do not directly contribute to environmental improvements, the move towards privatization should establish an economic environment favourable to the introducing of market-based measures.

64. As regards chemical fertilizers and pesticides, the rate of use has decreased in countries such as Bulgaria in the last five years owing to agricultural reforms, discontinuation of state subsidies, increase in costs, and training and extension programmes. In Hungary, various measures have also been taken concerning the use of nitrates. As for pesticides, a widespread network for the monitoring of crops allows residues and their impact on the environment to be controlled. Measures are also being taken to regulate the use of nitrogenous fertilizers.

(b) Major issues and challenges

65. In most of these countries, there did not exist a policy framework designed to influence producer, consumer and investment behaviour through the modifying of price signals. Thus, it is a case of needing not to review, analyse and modify existing policies but rather to design and implement a new policy framework. This has the advantage of offering an opportunity to learn from past mistakes connected with the policies of other (including developed) countries. However, there are few people with knowledge of and experience with market institutions, and the institutions through which policies can be administered are few in number and weak. The existence of only poorly organized markets with their inexperienced participants makes response behaviour less predictable than it would be in established markets. The provision of adequate education and training is a challenge, together with support to the formation of farmer groups and other non-governmental organizations to promote participatory decision-making for coherent policies aiming at the well-being of the rural population. It is likely that this will lead to major employment problems in rural areas which will require the establishment of alternative sources of income.

66. One of the serious problems encountered in the transition process which has critical implications for sustainability of agriculture production and use of land resources has been that concerning the processes of privatization and decollectivization of state and collective farms. Political pressure for rapid action has often resulted in distribution of land before legal instruments and institutions were in place to provide clear and transferable tenure rights. Land grabbing, together with excessive fragmentation, has prompted Governments to choose cautious approaches before a well-functioning land market is in place

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and individual rights and responsibilities are established. It is also difficult to design policy instruments to internalize environmental externalities associated with land use practices when tenure rights and responsibilities are not well established.

67. There has also been an excess of often conflicting policy advice from the various bilateral and multilateral assistance agencies. The already overtaxed capacity for policy analysis is being called upon to evaluate the "sustainability" of the policy advice offered by those who are looked to for help.

B. Experiences of major groups

68. In preparing this report, the task manager made an effort to reach out to major groups, in particular non-governmental organizations and farmers' and women's organizations. An invitation to contribute views and experience was sent out in July 1994 to over 30 international non-governmental organizations and regional and subregional non-governmental organization networks active in the area of SARD, more than half of them based in the developing world. The fact that individual replies were received from nine, including two from the South, demonstrates the difficulty of channelling to an international level the rich and diverse experience of organizations that have priority calls on their limited resources and cannot easily apply them to reporting. The material presented in this subsection thus presents only a partial view of major group experience.

69. It should be emphasized that there is no single non-governmental organization, much less a major group, view of SARD and of what its implementation entails. Many non-governmental organizations have, however, expressed their feeling that the perspective of chapter 14 of Agenda 21 is overly technological and insufficiently critical of the current development model. As these non-governmental organizations see it, chapter 14 fails to address the issue of the overall system driving unsustainability. The fundamental characteristics of the global food system that are incompatible with the objectives of SARD are, they feel, the dominant development model of unlimited economic growth, short-term profit and disregard for social and environmental "externalities"; underregulated international markets and transnational corporations, globally mobile capital, and a globalized food and agriculture system based on world prices well below the costs of production; structural adjustment programmes; indebtedness and debt repayment strategies; and systems of national accounts that fail to value a healthy environment, a productive resource base, preventive health care, and non-wage-type but essential social and reproductive work and stewardship of resources. One form of non-governmental organization follow-up to the Rio de Janeiro Conference has thus been a continuing constructive critique of SARD concepts, emphasizing such elements as democracy, participation, equitable access to resources, local solutions, cultural values, social justice and equity, and ecological agricultural systems often adapted from traditional methods. Concerns like these, expressed in the NGO Alternative Treaties on Sustainable Agriculture and Food Security adopted in Rio de Janeiro in 1992, have been reiterated in subsequent international non-governmental organization meetings such as the

"Bringing Rio Home" conference held in Mulheim, Germany, in September 1993, the "Down to Earth: Between the Summits" meeting held in Copenhagen in December 1993; and the International Week on Sustainable Agriculture and Food Security, which took place in Washington, D.C., in October 1994.

70. Non-governmental organizations have undoubtedly increased the intensity and effectiveness of their lobbying on SARD-related issues at the international level since the United Nations Conference on Environment and Development. Non-governmental organization-organized discussions and preparatory work are helping to ensure that SARD does not slip off the agenda of international conferences like the International Conference on Population and Development, the World Summit for Social Development and the Fourth World Conference on Women. At the same time, many non-governmental organizations note and are concerned that factors such as distance, limited human and financial resources, and unequal access to information are tending to distinguish between those non-governmental organizations that are closely following international processes and those, particularly in the developing world, that are not.

71. More generally, non-governmental organizations note that their involvement is now being solicited by a steadily increasing quantity of international actors and forums to an extent that is well beyond their capacity to participate in a substantive way. At the International Week on Sustainable Agriculture and Food Security, held in Washington, D.C., in October 1994, participants identified a need that they felt to think and act strategically, while planning for the long term and carefully selecting where to invest their energies, through, for example, taking preventive action to promote the establishment of frameworks for new developments like biotechnology; monitoring the impact of the Uruguay Round on agriculture in order to be in a strong position for the review process that will take place in four years time; maintaining links between community-level activism and policy-level advocacy at national and international levels; and maximizing research and information capacities in order to be able to demonstrate the viability of alternative approaches.

72. A number of international non-governmental organizations have reported post-United Nations Conference on Environment and Development activity to propagate SARD within their organizations. The International Federation of Agricultural Producers (IFAP) has adopted SARD policies at its World Assembly and is proposing action to strengthen farmers' organizations and links among farmers, researchers and extension services. The International Federation of Organic Agricultural Movements (IFOAM) is developing and promoting an international organic standard system aimed at maintaining the productive capacity of the soil. The Pesticides Action Network (PAN) is undertaking advocacy and fieldwork aimed at reducing dependence on chemical pesticides by promoting sustainable agriculture. The World Sustainable Agricultural Association (WSAA) has organized conferences on sustainable agriculture in Asia and South America. At the same time, less formal networking arrangements, as an effective and flexible way of exchanging experience across national and regional frontiers, have multiplied in the non-governmental organization world.

73. Non-governmental organization contributions to the task manager's report provide far less information on activity at national/local levels than at international ones. A report from the United Kingdom does indicate that a

pro-SARD movement is taking shape there and in other European countries. Non-governmental organizations and other interested parties are joining together to offer advice and support to Governments in developing cohesive policies for SARD at national and regional levels. Particular attention is being given to involving European farmers in the process.

74. Throughout the developing world, as non-governmental organization reports emphasize, indigenous organizations and local community groups have played a significant role in managing and developing natural resources. Examples are peoples' irrigation systems in northern Thailand, farmer-managed irrigation systems in Nepal and the waru-waru land management system in Peru, to name a few. However, such traditional systems are gradually being eroded in many parts of the developing world, as indigenous people are displaced and their agriculture strategies endangered. Non-governmental organizations play an important role in defending and rehabilitating those systems. The same holds true, as non-governmental organizations point out, for agricultural practices. Many of the practices now being pursued in the name of sustainability were traditional agricultural arts, pioneered and field-tested by peasant farmers. Among these are crop rotation, spatial diversification through cultivated crops and wild species on farms, biological pest control, soil-building through composting and green manuring, cover-cropping and conserving open-pollinated seed varieties.

75. There is an increasing wealth of non-governmental organization and other major group experience in Africa, Asia and Latin America, as organizations go beyond specific initiatives in limited areas to develop more comprehensive strategies for promoting peasant-based SARD. This wealth has not been captured in the present Commission on Sustainable Development reporting process, in spite of the fact that non-governmental organizations are attaching importance to more systematic analysis and exchange of experience.

III. MATTERS RELATED TO FINANCE AND TECHNOLOGY

A. Finance

1. Changing mode of financing

76. Agenda 21 estimated that the average annual cost (1993-2000) of implementing SARD was about US$ 31.8 billion of which about US$ 5.075 billion was to come from the international community as grant or concessional loans. How much of this total estimated funding requirement has been or will be achieved is a question this report cannot answer.

77. Financing efforts to promote SARD is a key issue, especially in developing countries. Various international, multinational and national agencies have been, and continue to be, the major source of finance for projects with environmental impact in those countries. It is especially the regional development banks, the International Fund for Agricultural Development (IFAD), UNDP and the World Bank that have been the main lending organizations for technical assistance and loans for agricultural and rural development projects in developing countries and economies in transition. Hence their policies on

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their appraisal of project proposals in the light of SARD objectives are crucial. As an example, IFAD has sharpened its focus on the financing of sustainable agriculture projects that can serve as replicable models for rural poverty alleviation. It has also begun an accelerated institutional learning programme on natural resource management for rural poverty alleviation, including proactive environmental assessments of 23 agricultural development projects. Since August 1994, IFAD has adopted formal procedures for environmental assessment to apply to all pipeline projects.

78. The Asian Development Bank has made a fundamental commitment to sustainable agricultural development (SAD). Post-United Nations Conference on Environment and Development activities include efforts to incorporate the United Nations Conference on Environment and Development agenda in the Bank's strategic planning process and the formulation of a strategic focus and agenda on SAD. It seeks to foster development of sustainable agricultural production systems and to ensure that the following elements of sustainability are incorporated in the formulation and implementation of Bank-financed projects: increased and stabilized productivity; rational use of natural resources; enhancement of the quality of life and the environment; and intergenerational equity.

79. Between 1992 and 1994, the Asian Development Bank approved a number of SARD-related projects which included (a) tropical crops development, and soil conservation and management in China, (b) tree crop development, upland farmer development, and sustainable agricultural projects in Indonesia, (c) watershed development in Bhutan, (d) environmental rehabilitation in Thailand, (e) tea development in Nepal, and (f) flood damage restoration in Pakistan. It has also assisted in institutional strengthening and environmental impact assessment activities in its member countries. Implementation of its SAD strategy is being supported by a number of parallel initiatives. These include rationalization of the policy environment in the Bank to promote renewable production systems; a continued increase in productivity; nutritional security activity; and transfer of technology, particularly biotechnology.

80. The World Bank is undertaking efforts to make the links among environment, agricultural development and poverty explicit in its project and programme lending. The main programme areas include natural resource monitoring and assessment studies; improvement of irrigation technology and water management to reduce pollution; arresting of salinity and waterlogging; and development and dissemination of improved farming practices.

81. The World Bank is currently financing 49 projects (in 35 countries) that serve directly to improve natural resources management. Funding for biotechnology is generally a component of these projects, with more loans for agricultural biotechnology. Countries like Brazil, India, China, Indonesia, Mexico and Turkey have been the biggest clients in drawing loans for environmental improvement. Likewise, new lending was also approved for 13 projects addressing rural environmental problems - so-called "green" projects involving new environmental borrowers such as Bhutan, Colombia, the Lao People's Democratic Republic and Uruguay as well as older clients such as China, India, Indonesia, Pakistan, Paraguay, Poland and Tunisia. Also, loans were approved for strengthening environmental institutions in the Gambia, the Republic of Korea and Morocco. Financial support was given to several sub-Saharan African

countries, to prepare NEAPs. However, most investments were directed towards forest protection and urban environmental improvements. In the area of poverty reduction and environmental management, 66 operations were approved by the World Bank during 1993-1994 of which 10 were specifically directed at natural resources management.

82. The World Bank has also promoted innovative financing mechanisms for the restoration of degraded lands and agricultural promotion projects. These projects seek to increase agricultural production and rural incomes by encouraging farmers at the micro-catchment level to adopt sustainable forms of land management and soil and water conservation.

2. Major issues and challenges

83. Though some progress towards changing the mode of financing mechanisms can be seen, the existing level of poverty and growing environmental problems raise serious questions about the sufficiency and the mode of financing to promote SARD in developing countries. In most of these, the potential cost of natural resources depletion and environmental degradation is very high compared with defensive expenditures or the investment made for environmental improvement.

84. There is a need to identify priorities, and mobilize additional financial resources, mainly at the household or farmer's field level. Identification of priority areas at the local, regional and national levels in each country and a search for alternative sources of funding are required to make the transition towards sustainable development. In some cases, however, rather than look for additional financing, it may only be necessary to avoid unsustainable practices. This may involve revoking past policies that rewarded speculative land clearance or subsidized chemical inputs. Conventional financing mechanisms aimed at promoting agricultural production, extension services and research priorities would have to be reoriented and restructured (rather than such sources being alone looked to for increased funding).

85. Not only should the alternative financing mechanisms to be developed be non-distortionary, but they should also mitigate market failures, internalize externalities and correct incentive structures. Within the changing context of sustainable development, developmental efforts should be able to pay its full costs, that is, the environmental and social costs; for this reason resources have to be priced at or equal to the marginal value or scarcity rent and incorporated into development-related decision-making.

86. Ex ante reduction in the use of potentially damaging inputs and waste generation will, wherever applicable, be a more practical way of minimizing their effects than ex post diversion of large amounts of resources. Each country has to work out the physical links between ecosystem resource use and productivity under different conditions for different products. The identification of these links will help in identifying additional physical and human resource and investment needs.

87. Efforts should then be made to prepare national plans on financing for sustainable development. In theory, considerable opportunity exists to use

public finance and fiscal policy to encourage a more sustainable use of natural resources. However, modifying the behaviour of the private users of resources is hampered in practice by the same valuation problem mentioned above. Pending further progress on valuing environmental goods and services, policies may have to be set using intuitive rather than fully rational criteria. Moreover, irrespective of quantification, the longer-term nature of environmental benefits puts them at a political disadvantage relative to pressing and shorter-term concerns when financing priorities are set.

88. Some progress on altering fiscal policies as part of structural adjustment programmes so as to discourage unsustainable resource use has been made. Funding under GEF has provided some financial means for Governments to subsidize activities having external, intangible or very-long-term benefits but, as already stated, GEF is not directly oriented towards SARD. Nevertheless, IFAD has established a framework agreement on GEF collaboration, whereby the GEF portfolio may be enriched with projects that address global environmental concerns through community-based resource management-related agricultural projects.

89. Since it is unrealistic to expect large increases in government or multilateral finance for environmental conservation and SARD, the need is to (a) refine the methodologies and means to strengthen the potentially powerful economic arguments for larger allocations in favour of sustainable agriculture within existing budgets; and (b) to assist Governments in framing policies that maximize the potential leverage on private behaviour and investment of available public finance, that is, to mobilize private sector investment in sustainable agricultural practices and particularly the labour inputs of small-scale farmers. FAO and the World Bank, the International Monetary Fund (IMF) and other multinational financing organizations have major roles to play in achieving these goals.

90. Several financing mechanisms are feasible for SARD. First, for making a transition to sustainable development, there is a need to reduce progressively or remove subsidies on chemical fertilizers, pesticides, irrigation water and electric power, and design economic incentives to avoid excessive input use. Second, self-financing mechanisms at the local level should be explored by guaranteeing farmers' rights. For example, the farmer's willingness to pay for the use of irrigation water and upper watershed protection could be captured. Likewise, the farmer's willingness to pay for the use of chemical fertilizer and pesticides (in areas where there is potential for groundwater and surface-water pollution) can be captured and used for developing organic farming methods. When farmers want either to convert to organic farming because conventional inputs are too expensive, or to have access to markets for organic foods, it is important to support the development of organic farming methods, adapted to the region concerned and to analyse the economics of conversion. Investment in infrastructural development projects can change the value of rural property and some taxes on these added values can be imposed and directed for off-farm income-generating activities. Likewise, private financing in promoting organic fertilizer and biotechnologies can be initiated through joint efforts of local universities, private entrepreneurs and farmers.

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91. Another way of generating revenue for environmental protection is through environmental tax reforms. This means shifting from conventional systems of taxing "goods" to taxing "bads". Examples are reducing land taxes and increasing water and water pollution taxes. Possibilities with respect to making such a shift in conventional tax systems and looking for the other mechanisms outlined above should be explored by each country, and areas where international cooperation and financing are needed should be worked out.

B. Technology

1. Progress on technological development and technology transfer

92. Case-studies conducted by the United Nations Conference on Trade and Development (UNCTAD), the World Bank and others, including non-governmental organizations, demonstrate that sustainable production techniques exist and that farmers in both developed and developing countries are showing an increasing interest in their adoption. Farmers respond positively when the necessary incentives are provided and when extension services are available and the macroeconomic framework as well as international trade opportunities is favourable.

93. Increasing consumer concerns regarding the quality of food and the environment, and hence the demand for "organically" produced products (both foods and agricultural raw materials), has an important potential for improving environmental standards and promoting the technologies to meet these standards.

94. FAO, in cooperation with other international organizations, national Governments and non-governmental organizations, has promoted, introduced and implemented various environment-friendly technologies in the past. For soil conservation, such technologies include cover crops, wind-breaks, timing of cultivation according to weather conditions, contour cropping, selective and more shallow ploughing, minimum- or no-tillage agriculture, and maintenance of organic-matter content through organic manure or composting of green-manure crops and crop residues. Bioenergy conversion of agricultural and livestock wastes also offers alternatives for energy and fertilizer production. Together with the International Atomic Energy Agency (IAEA), FAO is exploring possibilities for employing the sterile-insect technique to eradicate the Mediterranean fruit fly in the Mediterranean basin, a technique that led to the recent eradication of the screwworm in North Africa.

95. Another track with respect to insuring sustainable agriculture is to use environment-friendly "conventional" pest and weed control technologies, an approach already adopted by several developed countries such as Denmark and Sweden. The wider introduction of these technologies in developing countries has to be based on their local needs, knowledge and agro-ecological conditions. Developing countries also have an urgent need to augment their capabilities for the production of less hazardous pesticides, while ensuring conservation of the environment through adequate treatment of effluent. Promotion of environment- and user-friendly, IPM-compatible pesticides and their formulations, including botanical pesticides such as that derived from the neem tree in Asia and microbial pesticides based on the bacterium Bacillus thuringiensis, is another

approach. Regional National Pesticides Production in Asia and the Pacific (RENPAP) under the UNDP/FAO/UNIDO FARM project is aimed at creating a self-sustaining functional Regional Network, catering to the information, individual consultancy and training needs of its 15 member countries. The Regional Network will support the production of botanical pesticides, the safe production of pesticides and effective waste disposal management in pesticide production facilities.

96. There is a search for alternatives to large-scale chemical control methods, combined with cultural weed controls, breeding programmes directed towards crop selection for tolerance of weeds and plant breeding for insect and other pest resistance. Application of the International Code of Conduct on the Distribution and Use of Pesticides 9/ as well as PIC is exerting pressure on pesticide users to adopt less toxic products as well as IPM technologies.

97. The World Bank has set out to identify the existing technology gap and address the issue for the purpose of increasing the productivity of existing resources in order to minimize the pressure on marginal areas. Examples of efforts in this area are the co-managing of a project researching exploitation of local sources of rock phosphate in sub-Saharan Africa; the promoting of innovative land management projects such as the expansion of technologies for conservation tillage in tropical environments throughout Latin America and into Africa; the broad dissemination of research into and field trials of various vegetative barriers for land conservation; and the developing of an agenda on Soil-Water-Nutrients management (SWNM) in collaboration with CGIAR centres and national research systems. Other components of the project on innovative approaches include the promotion of sound agricultural practices such as crop rotation, green manuring, alternative cultivation practices, small-scale mechanization, and weed and pest control.

98. The CGIAR system aims to harness modern science to the sustainable development of agriculture. In close coordination with national research facilities, the different centres of CGIAR are working for more resource-efficient technologies for food production while protecting and enhancing the natural resource base. Along the same lines, CGIAR has identified research areas, central to chapter 14 of Agenda 21, including the contribution of genetic improvement to disease and pest resistance; the increased use of nitrogen-fixing plants and reduced dependence on artificial fertilizers; the effectiveness of IPM research in reducing dependence on chemical pesticides; the potential of crop mulches to contain soil erosion; integrated agricultural resources management; and the application of improved agroforestry technologies. The different centres of CGIAR are taking on responsibilities for research and dissemination of results in these areas, as well as adopting an ecoregional approach to the development and transfer of sustainable agricultural technologies.

99. Nuclear techniques have increasing application in modern agricultural technologies that are supportive of SARD by enhancing productivity and permitting the replacement of conventional environmentally damaging techniques. Examples, drawn from the joint work of IAEA and FAO, include the use of radioisotopes for labelling deoxyribonucleic acid (DNA) in the manipulation of plant germplasm, and for studying the utilization of plant nutrients and the

fate of pesticides and other contaminants in the soil; the irradiation of food to replace chemical fumigants; and the production of sterile insect pests. The Agricultural Laboratory at Siebersdorf (Austria), a facility which is being expanded, is undertaking research, training and transfer of technology in this scientific area.

2. Major issues and challenges

100. Developing countries and, to some extent, economies in transition, face problems in evolving local-level indigenous technology, and in transferring clean technology from the developed countries, as well as in adopting and making efficient use of such technologies. Some farmers in these countries have been practising organic farming, traditional terracing, tillage and resource conservation methods for many years. However, the lack of farmers' capability to cope with the changes in the physical environment and the lack of understanding of these indigenous technologies and methods by those concerned in implementing government interventions have inhibited their development. At the same time, developed-country farmers can learn from the principles of such techniques, adapted to different agro-ecological and socio-economic conditions. As yet, there is no formal mechanism for such exchange.

101. Biotechniques are being increasingly used to create new, more productive strains of crop plants (transgenics in rice is a recent example), plant and animal diagnostic products, animal vaccines, biological pesticides and other biological control agents. However, their benefits are skewed towards the more developed countries - towards their farmers, crops and animals. The safety, cost and relevance of biotechnology should be assessed and compared with available traditional technological options. An international code of conduct on biotechnology developed by a multinational organization such as FAO would be a useful instrument in assessing biotechnology. Lack of international and national guidelines on the release of genetically modified organisms (GMOs) is also a major concern. Environmental impact assessments on GMOs need to be in place and biotechnology needs to be assessed for its impacts on poor and marginalized farmers.

102. Local innovation, development, transfer from outside and adoption of developed technologies require training for farmers and field educators. Education on improving fertilizer application methods and individual fertilization plans should be encouraged. As farmers also have experience of these technologies, their experience should be utilized. Other requirements are the developing of guidelines for legislators, extension advisers, and farmers on the best practical and the least harmful means of handling animal wastes. Likewise, the promotion of multispecies livestock production systems to increase waste and by-product recycling can lead to more efficient use of feed energy and nutrients.

103. Other major issues related to technological factors in developing countries are (a) information as well as misinformation, that is the amount and quality of information on technology, (b) efforts on developing participatory types of technology, (c) promoting traditional methods, technologies and knowledge, (d) basic scientific research, (e) financing technology transfer and

cooperation, and (f) disseminating lessons learned from past experiences. Developing countries should be helped not only by direct transfer of clean technologies suitable to their agro-ecological conditions but also by developing their own technology through local participation in order to develop their self-sustaining capacity.

IV. RECENT DEVELOPMENTS AND EXPERIENCES IN INTERNATIONAL COOPERATION

A. Intergovernmental cooperation

104. In Western Europe, the Economic Commission for Europe (ECE) adopted a decision on "Cooperation in the field of environment and sustainable development". The Commission also requested its subsidiary bodies to strengthen their activities in this field. An ECE workshop on Environmental Performance Review (EPR) in OECD countries in cooperation with OECD took place in May 1994. It stressed the need for close cooperation with other international organizations for the EPR process. The framework to be used for the EPRs includes the following elements related to agriculture: agricultural run-off as a source of water pollution; agricultural waste; landscape and habitat conservation; environment-related legislation; enforcement and compliance mechanisms; monitoring systems; environmental policy and integration with economic policies; land use planning; economic instruments; environmental considerations in the legislation on privatization; and land reform. OECD is also actively engaged in the analysis of the linkages between agriculture and the environment in the context of these policy reforms, and concerned with the need to promote sustainable agricultural practices with the least economic distortions.

105. In the countries of South Asia and the Pacific, the Economic and Social Commission for Asia and the Pacific (ESCAP) is carrying out a series of country studies, national seminars, regional meetings, and other technical assistance activities to promote sustainable agriculture.

106. In the countries of Western Asia, the Economic and Social Commission for Western Asia (ESCWA) is focusing its activities on resource conservation in some countries to assess the current status of resource degradation, prepare a sustainable land use plan, and analyse micro- and macro-policies and their linkages to sustainable resource use.

107. FAO, as one of the responsible United Nations organizations promoting SARD in the area of policy changes, is being requested by its member countries, both developing and those with economies in transition, to assist in reviewing existing policies and in formulating policies more consistent with SARD. In the past, FAO responded to such requests by (a) fielding missions and undertaking projects for policy analysis assistance and building capacity for policy analysis; and (b) taking actions to ensure that all policy assistance provided by FAO would take into account SARD objectives. FAO is also actively engaged in a number of areas where the concerns of agricultural trade and the environment meet. FAO's commodity and trade policy activities stress achieving growth and stability of international markets through producer/consumer consultations,

particularly through the Committee on Commodity Problems (CCP) and its Intergovernmental Groups. FAO is also helping countries develop their policies on environment and assisting them in their efforts to expand their agricultural trade in sustainable ways.

108. A concrete example of FAO's activities on environmental and trade issues is its work on strengthening the competitive position of natural vis-à-vis synthetic fibres, because of the greater environment-friendliness of the former. During the last two years, the Intergovernmental Group on Jute, Kenaf and Allied Fibres has been examining environmental issues having an impact on trade with respect to the products covered by the Group.

109. CCP also encouraged the Intergovernmental Groups to undertake commodity-by-commodity studies that would include (a) technical environmental reviews; (b) economic assessments of the costs of reducing environmental damage and of adopting SARD/environmental policies; and (c) national and international policy support to countries to adopt appropriate SARD/environmental policies. A methodology for economic assessment of commodity-specific environmental impact is under preparation, as well as case-studies on individual commodities.

110. The intergovernmental machinery of UNCTAD is also dealing with the issues related to SARD in different areas. Its Trade and Development Board is considering one specific topic related to trade and environment each year. In 1994 the specific topic was "The effects of internalization of external costs on sustainable development" and in 1995 it will be "The impact of environment-related policies on export competitiveness and market access". In 1993, the Standing Committee on Commodities discussed "Experiences concerning environmental effects of commodity production and processing" within the context of "fostering sustainable development in the commodity field". The agenda for its third session in September-October 1994 included "Identification of the means by which the competitiveness of natural products with environmental advantages is improved".

111. In the area of land conservation and rehabilitation, an important development since the United Nations Conference on Environment and Development has been the agreement reached in Paris, in June 1994, on a text for an International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (A/49/84/Add.2, annex, appendix II). This convention has four regional implementation annexes which provide for action in different regions.

112. At its 1993 Conference, FAO adopted a Special Action Programme for Land Conservation and Rehabilitation. This programme will continue to implement the existing International Scheme for the Conservation and Rehabilitation of African Lands (ISCRAL) and will also develop and help implement similar schemes for two other regions - Asia and the Pacific and Latin America and the Caribbean.

113. FAO is also taking active part in promoting IPM both in developed and in developing countries. In meetings of the FAO/UNEP Panel of Experts on IPM, of the International Agricultural Research Centres, and of the International IPM Working Group, and in other meetings organized by FAO and other international

organizations including the World Bank, UNDP and UNEP, ways to promote IPM have been discussed and priorities established.

114. Within the Special Action Programmes (SAP) formulated by FAO in response to the challenges posed by SARD, the two programmes on conservation, development and use of plant and animal genetic resources for agriculture are designed to promote in situ and ex situ conservation, evaluation, monitoring and use, and capacity-building for research and development in member countries. FAO is carrying out these activities in partnership with farmers, rural communities, national and international agricultural research institutions and non-governmental organizations. At the national level, FAO continues to support the establishment and/or strengthening of national capacities to conserve, manage and use genetic diversity, including crop diversification and the use of underutilized and multi-purpose species.

115. An early warning mechanism is also being developed to draw rapid attention to hazards threatening the operations of genebanks holding germplasm collections, and to the danger of the extinction of plant species and the loss of genetic diversity throughout the world. Progress has also been made in developing the global network through the renegotiating of an agreement between FAO and CGIAR on the location of CGIAR centre collections. There have also been contacts between FAO and national Governments on participation in the network. In India, FAO is advising an NGO on in situ conservation of PGR.

116. The Inter-American Institute for Cooperation on Agriculture (IICA) is collaborating with its member States in the design of policies, sectoral studies and institutional reforms, and in advisory services on sustainable agriculture. Also, IICA's strategy has focused on establishing new horizontal cooperation networks such as the Programa cooperativo de Investigación y Transferencia de Tecnología Agropecuaria para los Trópicos (PROCITROPICS) (or cooperative programme in land and cattle-related research and technology transfer for the tropics) which brings together eight countries of the Amazon basin and subregional networks on the subject of plant genetic resources management and conservation.

117. In the indo-gangetic region, an initiative has been taken among the countries of the region to strengthen their collaboration on research into the causes of the declining response to conventional inputs, and into new sustainable technologies suitable for the farmers of the region. The initiative was launched in January 1993 between senior agricultural administrators of Bangladesh, India, Nepal and Pakistan, together with the CGIAR centres - the International Rice Research Institute (IRRI), the International Centre for Maize and Wheat Improvement (CIMMYT) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) - with the support of UNDP, the World Bank, the Asian Development Bank and various bilateral donor agencies. It is designed to facilitate this collaboration, as well as to provide guidance on policy and on a strategic research framework for addressing these issues.

118. In the area of rural energy, the World Bank is supporting the continued expansion of electricity distribution systems. Examples of Bank programme and project innovations in this area include:

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(a) Extensive use of photovoltaic cells in poor/rural areas that would not otherwise be served by the national or regional power grid (especially for rural health clinics, village water pumping, battery charging for village use);

(b) In Estonia, a district heating rehabilitation project that, rather than rely on imported oil, supports the replacement of small boilers and their conversion to peat and wood;

(c) Programmes that encourage alternatives to biomass for fuel, such as the Calub Gas Development Project (Ethiopia), which is replacing wood fuels with liquefied petroleum gas in the south-eastern region of the country;

119. The Committee on New and Renewable Sources of Energy and on Energy for Development, at its first session, held in February 1994, noted with concern that, on the eve of the twenty-first century, 2.5 billion people in the developing countries still had little or no access to commercial energy supplies and electricity. 10/ The Committee recommended to the Economic and Social Council the adoption of a draft decision by which it would decide that the Committee should hold a session in February/March 1995 in order to provide advice on energy for rural development to the Commission on Sustainable Development at its third session, as provided for in Agenda 21. 11/ The recommendations of the Committee will be submitted to the Commission on Sustainable Development at its third session.

B. Cooperation within organizations of the United Nations system

120. Several cooperative activities have already been described elsewhere. Among United Nations organizations, FAO has initiated a number of actions such as (a) establishing a Special Action Programme for Country Policy Assistance for food security; (b) providing funding to support cross-sectoral activities within its Inter-Departmental Working Group for Environment and Sustainable Development and its specialized subgroups; (c) forming a new department of sustainable development which will provide more centralized leadership and greater visibility for this area of work when it is established in early 1995; (d) undertaking activities to improve the capacity of FAO and others to evaluate policies that integrate environment and sustainable development goals.

121. Among other coordinated efforts within United Nations organizations are (a) establishment of a working party on relations between agriculture and the environment in Europe in cooperation with ECE; (b) implementation of a farming-systems approach to development in Latin America, with support from other international agencies such as CGIAR, the World Bank, IICA, the International Cooperation Centre of Agricultural Research for Development (CIRAD)-SARD and national institutions; (c) implementation of an integrated approach to land and water management activities in cooperation with ESCWA; (d) activities on "Sustainable Agricultural Development Strategies" in Asia and Pacific countries in cooperation with ESCAP, UNDP and UNIDO; and (e) carrying out of research activities on sustainable farming systems in collaboration with CGIAR institutions.

C. Organizations outside the United Nations

122. The post-United Nations Conference on Environment and Development period has seen an increase in cooperation between non-governmental organizations and the United Nations family in the area of SARD. As the United Nations specialized technical organization in the field of agriculture, FAO has a special responsibility to develop such cooperation, in both policy formulation and field programmes. Non-governmental organizations are participating in a number of SARD-related normative activities, such as technical meetings related to the International Code of Conduct on the Distribution and Use of Pesticides and to the elaboration of standards for organic products within the FAO/WHO Codex Alimentarius. Non-governmental organizations are also well-established partners in FAO's efforts to promote the conservation and use of plant genetic resources, and will be closely associated with the preparations for the Fourth International Technical Conference on Plant Genetic Resources to be held in 1996. A consultation focusing on "NGOs and SARD in Asia: Challenges for Policies and Practises" was organized by FAO in September 1993, and non-governmental organizations have participated in the preparation of two issues on SARD in FAO's Development Education Exchange Papers (DEEP) Series: one issue on Latin America/Asia and the other on Africa/the North.

123. At the field level, FAO and non-governmental organizations in Africa, South Asia and Latin America have formulated regional components of a cooperation programme aimed at strengthening non-governmental organization capacity to promote sustainable farming systems and food security for peasant households, for which resources are being sought. FAO has drawn on the services of a Brazilian non-governmental organization, Assessoria e Servicos a Projetos em Agricultura Alternativa (AS-PTA), to assist a national peasant federation in Senegal (Fédération des organisations non gouvernementales sénégalaises (FONGS)) in promoting village-level reflection on the impact of structural adjustment on peasant agriculture and the environment. Field-level cooperation with non-governmental organizations is also an important part of the IPM programme in Asia and of the UNDP/FAO/UNIDO FARM programme in Asia.

V. CONCLUSIONS AND PROPOSAL FOR ACTION

A. Conclusions: has the path towards SARD been followed?

124. Apart from the lack of sufficiently comprehensive indicators, 12/ the reaching of definite conclusions about progress in implementing SARD following the United Nations Conference on Environment and Development is complicated by the fact that people have different perspectives of SARD shaped largely by the socio-economic environments in which they live. There is a corresponding diversity with respect to the sustainability of the agricultural and rural development path pursued, the nature of the environmental problems and the importance given to each specific programme area identified in chapter 14 of Agenda 21.

125. Environmental impacts in the agricultural sectors in OECD countries are rooted in increased production of agricultural commodities using more inputs, especially farm chemicals, with less labour and largely unchanged land area.

The environmental problems have been aggravated by agricultural policies - which have encouraged increasing production of some commodities on fragile lands and the use of inappropriate farm practices - and the lack of markets to value environmental public goods or the failures of some markets to internalize environmental costs and benefits within farmers' decision-making. The clear policy message is that agricultural policy reform (which has started to a limited extent in many OECD countries, and is underpinned by the recent Uruguay Round Agreement) is a necessary condition for tackling many of the environmental problems in agriculture. However, this reform will need to be supported by well-targeted policy approaches to addressing remaining environmental concerns in ways that are cost-effective from the point of view of domestic economic efficiency, government budgets, and administrative efficiency, and that also minimize international trade distortions. In the developing countries, the problems are related more to poverty and to lack of productive technologies. In the countries with economies in transition, the main difficulties to be confronted are weak institutions and poorly developed markets. They are also much concerned with industrial or "brown" environmental problems. Solutions will therefore be different although they will share common features: the need for coherent and transparent policy-making and appropriate legal measures at the national level, combined with strong political commitment; the widespread participation of those involved - the stakeholder - in the decision-making process; and finally, means to ensure that the process of globalization - of agricultural trade, capital flows and information - does not impact adversely on the environment and benefits small-scale farmers.

126. Disappointment is widely expressed at the lack of progress in moving towards SARD, even in the relatively short period since the United Nations Conference on Environment and Development. Yet the previous discussion shows that progress has been made although it has been uneven and, in some cases, not driven by a desire to implement SARD itself. Clearly much remains to be done in virtually all countries and the task has barely begun. It may be concluded, however, that perhaps there is now less need for broad advocacy of SARD, as represented by the Brundtland report, for example, and a much greater need for scientific implementation. This implies a need for more applied and strategic activity, in other words, problem-solving, research and information-sharing and more committed policy-making processes.

127. In the process of trying to gather together these thoughts trawled from a wide range of contributions to the present report, the following more specific conclusions emerged, leading to proposals for action:

(a) A productive agriculture is an essential prerequisite of SARD, with its multiple objectives of reducing poverty and improving livelihoods while conserving and protecting the natural resource base. At the same time, achieving SARD is a complex and slow-moving process, demanding patience, endurance and the willingness to exploit opportunities for stepwise advance over a wide range of quite confined activities, such as IPM, but within an overall strategy;

(b) Within the context of the situation of the majority of developing countries as well as the economies in transition, there needs to be an appropriate incentive environment that promotes, in particular, private sector investment in agriculture and its supporting systems, and rewards environmental protection;

(c) In all countries, policies oriented towards promoting food and agricultural production and rural development and raising or maintaining farm incomes, while protecting the natural resource base, need to be coherent, consistent and mutually supportive;

(d) There is a need for a deeper and wider understanding of socio-gender-cultural-economic relationships between the farmer and his or her environment at the household and community levels and of the biophysical processes that underlie the interactions between farming activities and the ecologies in which they take place. Such understanding will improve the coherency and consistency of agricultural and environmental policies, improve the efficiency of measures to implement them and support the development of the appropriate indicators of sustainable agricultural activities needed to assess the status of a wide variety of ecologies in which farming takes place, and to monitor changes in status;

(e) The evidence from farms and communities from around the world shows that sustainable agriculture can be achieved in all three country typologies dealt with in this report, so as to bring both environmental and economic benefits to farmers, communities and nations. In this regard:

(i) In the industrialized agricultural systems, a transition to sustainable agriculture could mean a fall in per hectare yields of 10-20 per cent in the short term, but with better levels of financial returns to farmers;

(ii) In the high input and often irrigated lands of developing countries, farmers adopting regenerative technologies have maintained yields while substantially reducing inputs;

(iii) In the diverse, complex and "resource poor" lands of the third world, farmers adopting regenerative technologies have doubled or trebled crop yields, often with little or no use of external inputs, at least in the short term.

There is a need, however, for a better sharing of information, on both sustainable indigenous and modern technologies, to expand their use on a wider scale. This process will benefit from the moves towards increased networking and use of advanced information technologies;

(f) The above conclusions converge towards awareness of the need for a significantly greater emphasis on a wide range of agricultural research and information-sharing efforts. That agricultural research is currently underfunded constitutes a serious and potentially disastrous flaw in the global strategic approach to meeting future demands for food and agricultural products and to implementing SARD. There is a need to develop new agricultural technologies and better exploit existing technologies to permit the sustainable intensification of the more agriculturally productive areas, while enabling livelihoods to be protected in the more agriculturally marginal ones. In many situations, though a range of information exists, that information must be more widely and equitably shared;

(g) Trade, and international food and agricultural trade in particular, has paradoxical features with regard to the environment and to the implementing of SARD. On the one hand, it offers opportunities to expand output beyond the demands of the domestic household, local and national markets and so creates employment, raises incomes and provides an incentive to invest in agriculture. On the other, in progressively eliminating the limitations on local or national markets, through the working of unfettered market forces, it can lead to the spoliation of natural resources. However, controlling the flows of trade for environmental reasons is generally not an efficient response and can lead to forms of environmental protectionism. It is better to tackle the problem of environmental damage at the source typically through the internalization of externalities, for example, by applying the polluter pays principle;

(h) Finally, reporting progress on achieving SARD, as well as making cross-country comparisons and identifying policy gaps, should be based on an agreed set of indicators. As mentioned, efforts for developing "sustainability" indicators are under way, but in rather fragmented ways. Such efforts should also proceed with improving the existing system of national accounts. Reorientation of data-collection and information management systems at the national levels, in each group of countries, would be an important component of such an initiative.

B. Proposals for action

1. Overall strategy

128. Chapter 14 of Agenda 21 provides a comprehensive plan of actions for implementing SARD, based on several distinct programme areas. Making SARD operational involves establishing the appropriate national policy environment at both agricultural and rural-related sectoral and macroeconomic levels within an internationally agreed framework of practices regarding trade and capital flows and treatment of property rights, setting up mechanisms to facilitate people's wide participation in decision-making, and moving ahead in several distinct yet interlinked technical areas such as land and water conservation and management, genetic resources, integrated pest management and plant nutrient systems, to name a few identified in the chapter. In these areas, the task is to obtain a better understanding of processes, sharpen concepts and approaches, fund field activities and learn from mistakes and successes.

129. The overall strategy should thus be towards focusing on the wider issues of institutional and policy changes that are needed to provide the right incentives and support mechanisms for the adoption of technology required to increase production efficiency, while promoting diversity, increase resilience and minimize environmental risks. With respect to national Governments, the message is a need for greater political commitment on their part to assuming responsibility for guiding progress towards SARD by making the required policy shifts and by reinforcing the participatory efforts of individuals, community organizations and non-governmental organizations.

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130. All of these national-level actions have to be set within a broader political framework reflecting commitment to achieving largely socially related goals. These include reducing levels of poverty, integrating population factors with development and the environment, and empowering women so as to achieve greater gender equality. The move towards these goals will be effected through achieving more specific targets, such as universal primary education and health-care services, including reproductive health care, as set forth at a series of United Nations conferences. 13/

131. The message for the international community, including donor countries and multinational agencies, is to shape and support the undertaking of these measures through addressing the issues of development finance, international debt, trade and the environment, technology transfer and intellectual property rights and rewards for environmental stewardship. The overall message is to make a faster transition to the achieving of SARD.

2. Specific proposals for action

132. The proposals that follow are the result of the process of consultation between FAO as task manager and its partners, including non-governmental organizations, in preparing this report. They were presented in outline to the Council of FAO, at its one hundred and seventh session in November 1994, and the Council of FAO supported their submission to the Commission on Sustainable Development.

133. The proposals are to:

(a) Develop indicators for monitoring the status and trends of the various agricultural and non-agricultural dimensions of SARD objectives and guidelines for sustainable agricultural practices for a variety of ecological and socio-economic settings. There is a need to develop better statistical information and develop simple and low-cost indicators for monitoring SARD. Principles and guidelines are needed to assist countries in collecting and analysing information at the agro-ecological zone and/or the farming-system level to promote appropriate SARD policies. Development of information systems that analyse, in an integrated manner, the environmental, social and economic dimensions of SARD are under way in several organizations but are fragmented and lack visibility. This work should be accelerated and carried out in a more coordinated manner among agencies, non-governmental organizations and countries. Efforts should be made as soon as possible to collaborate with countries in developing the information base, identifying indicators and establishing SARD information systems;

(b) Review economy-wide and sectoral policies with regard to their compatibility with SARD objectives and use appropriate incentives and other measures to promote the adoption of sustainable agricultural practices and attain other SARD objectives. Some countries have already undertaken or are undertaking wide-ranging policy reviews as part of NEAPs and similar exercises. However, many countries have still not done so and often economy-wide and sectoral policies diverge widely in their focus and impact on SARD. The aims are to have a consistent and coherent policy framework within which to launch programmes and projects fulfilling the broad objectives of SARD, tailored to the particular situations of different countries, and to increasingly internalize environmental externalities within market prices;

(c) Increase support to research and technology development for the sustainable intensification of agriculture, through the strengthening of national research institutions, the development of regional cooperative networks and the enhanced support of the CGIAR system. Agricultural research, particularly strategic, problem-solving research, has been consistently underfunded, although mechanisms exist for such funding such as CGIAR and its International Agricultural Research Centres, including the International Service for National Agricultural Research (ISNAR). The Commission on Sustainable Development may wish to support the recent initiative of the World Bank regarding CGIAR funding and recommend more consistent donor support in line with SARD objectives;

(d) Extend to a wider number of countries the ongoing FAO programmes and projects for sustainable land and water management in agriculture, IPM and integrated plant nutrition systems (IPNS), involving the collaboration of other institutions such as UNEP, the CGIAR centres, UNDP, the World Bank, and a range of non-governmental organizations. The strategy for implementing SARD consists of moving ahead in several well-defined programme areas. Some of these have been defined by FAO as Special Action Programmes which involve the collaboration of a variety of other institutions (United Nations bodies, non-governmental organizations, and so on), to develop approaches, formulate, fund and operate projects and distil experiences. The Commission on Sustainable Development may wish to draw attention to FAO's Integrated Cooperative Programme Framework for SARD (ICPF/SARD) and its component Special Action Programmes as a means of bringing together the initiatives of different development partners in a defined programme area with a view to implementing SARD;

(e) Strengthen national and international action for the conservation and sustainable use of animal genetic resources, thereby bringing international cooperation and support to a level similar to that of ongoing initiatives on plant genetic resources. There has been recent progress concerning the revision of the International Undertaking on Plant Genetic Resources for Agriculture so that it is in line with the Convention on Biological Diversity, the defining of the concept of farmers' rights and the launching of the preparatory process of the Fourth International Technical Conference on Plant Genetic Resources, to be held in 1996. Comparable international attention to and progress in the area of animal genetic resources have not been achieved, although a first world watch list of endangered species has been published. A global strategy for the conservation of animal genetic resources is being designed and the broadening of the mandate of the Commission on Plant Genetic Resources to include other forms of genetic resources is now under discussion. The Commission on Sustainable Development may wish to support these processes;

(f) Promote international cooperation and national action for sustainable and environmentally sound production and use of energy by rural communities and agro-industry. The challenge is to develop a strategy to facilitate and expedite the transition towards the sustainable use of an appropriate mix of traditional, conventional and renewable sources of energy for rural communities and rural economic activities in a variety of socio-economic settings;

(g) Analyse the implications for SARD of the Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations 14/ at national, regional and international levels, through FAO collaboration with UNCTAD and the proposed Committee on Trade and Environment of the World Trade Organization. Concern is widespread that moves towards the liberalization of food and agricultural trade arising from the conclusion of the Uruguay Round of multilateral trade negotiations, while benefiting countries and farmers able to exploit the resulting market opportunities, may have adverse effects on the environment and on small-scale farming. There is also concern that environmental standards will be unilaterally lowered to maintain national competitiveness in food and agricultural markets. The aim of the analysis would be to assess such concerns, identify problems and recommend solutions;

(h) Ensure that SARD objectives are pursued with the full participation of rural people and their communities, and strengthen the capacities of local governments and private sector non-governmental organizations and rural people's organizations (farmers' organizations, cooperatives, rural workers' organizations, informal groups, community associations and so forth) in decision-making and the implementing of environmentally sound and socially just agricultural and rural development programmes. Participation involves democratization and the effective reduction of socio-cultural, economic and political constraints on the formation of local-level groups of a variety of types (comprising indigenous people, farmers, women, rural youth, and so on). Existing mechanisms to improve this process in rural areas need to be reviewed by all concerned organizations including FAO, the United Nations Development Fund for Women (UNIFEM) and UNDP, as well as national and local government agencies and non-governmental organizations. Such reviews should aim at enhancing existing mechanisms and identifying new ones, and may be part of the regular monitoring of the World Conference on Agrarian Reform and Rural Development (WCARRD) Programme of Action, 15/ and of People's Participation in Rural Development: the FAO Plan of Action. 16/

134. Should the above proposals for action be endorsed by the Commission on Sustainable Development, the cooperative mechanisms established by the task manager for preparing this report, could also serve as a means for their implementation within a collaborative framework. The basis for such collaboration would be the institutional comparative advantage of the various partners.

Notes

1/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

2/ Rome, FAO, 1987 (C 87/27, July 1987).

3/ Oxford and New York, Oxford University Press, 1987.

4/ FAO Council, Report on FAO/Netherlands Conference on Agriculture and the Environment (Rome, FAO, May 1991), appendix A, first part, sect. II (1).

5/ Rome, FAO, 1993 (C 93/24, November 1993).

6/ AT 2010 projects a positive (that is to say, the most likely) scenario rather than a normative (desirable) one.

7/ See United Nations Environment Programme, Convention on Biological Diversity (Environmental Law and Institutions Programme Activity Centre), June 1992.

8/ United Nations Environment Programme, 1987.

9/ Rome, FAO, 1986 (M/R8130/E/5.86/1/3000).

10/ See Official Records of the Economic and Social Council, 1994, Supplement No. 5 (E/1994/25 and Corr.1), para. 4.

11/ Ibid., chap. I, sect. B, draft decision I.

12/ Various bodies, such as the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, FAO, the Statistical Division of the United Nations Secretariat, UNEP, WHO, OECD and some non-governmental organizations, are working on a series of sustainability indicators, including those for chapter 14 of Agenda 21, but they are only at a preliminary stage.

13/ Recent conferences include the United Nations Conference on Environment and Development and the International Conference on Nutrition, both held in 1992, and the International Conference on Population and Development (1994). Of course, these targets stretch back to the World Food Conference (1974) and the World Conference on Agrarian Reform and Rural Development (1979).

14/ Legal Instruments Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, done at Marrakesh on 15 April 1994, vol. I.

15/ See Report of the World Conference on Agrarian Reform and Rural Development, Rome, 12-20 July 1979 (WCARRD/REP); transmitted to members of the General Assembly by a note of the Secretary-General (A/34/485).

16/ Rome, FAO, 1992.

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REVIEW OF SECTORAL CLUSTERS, SECOND PHASE: LAND, DESERTIFICATION, FORESTS AND BIODIVERSITY

Conservation of biological diversity

Report of the Secretary-General

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INTRODUCTION

1. The present report reviews progress in the implementation of the aims set out in chapter 15 of Agenda 21 1/ (Conservation of biological diversity) since the United Nations Conference on Environment and Development (UNCED) and presents a set of recommendations for action. The report was prepared by the United Nations Environment Programme (UNEP) as task manager for chapter 15 in Agenda 21, in consultation with the United Nations Secretariat, in accordance with arrangements agreed on by the Inter-Agency Committee on Sustainable Development at its fourth session. It reviews the progress achieved since UNCED and highlights the major biodiversity issues that it is considered would benefit from the further considerations, support and guidance of the Commission on Sustainable Development.

2. The conservation of biological diversity, which is addressed principally in chapter 15 of Agenda 21 but also in several other associated chapters, will be considered by the Commission within the cluster "Land, desertification, forests and biodiversity" at the current session. The objectives of chapter 15 are aimed at the conservation of biological diversity, the sustainable use of biological and genetic resources, the fair and equitable sharing of the benefits arising from the use of those resources, and the implementation of the Convention on Biological Diversity, 2/ the objectives of which they specifically reflect. Many of the issues covered in chapter 15 are addressed in other chapters of Agenda 21, as well as in the Convention on Biological Diversity and other international instruments, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 3/ the Convention on the Conservation of Migratory Species of Wild Animals (CMS), 4/ the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR), 5/ the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and for Desertification, particularly in Africa (A/49/84/Add.2, annex, appendix II), and the regional seas programmes.

3. In the preparation of the present report, valuable contributions were received from a wide range of United Nations agencies and bodies, including the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, the Food and Agriculture Organization of the United Nations (FAO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Conference on Trade and Development (UNCTAD), the United Nations Industrial Development Organization (UNIDO), the International Labour Office (ILO), the International Fund for Agricultural Development (IFAD), the World Meteorological Organization (WMO), the International Maritime Organization (IMO), the United Nations Population Fund (UNFPA), the United Nations Children's Fund (UNICEF), the International Telecommunication Union (ITU), the World Bank, the United Nations Environment Programme (UNEP); the regional commissions; regional intergovernmental organizations; and many non-governmental organizations, including The World Conservation Union (IUCN), the World Resources Institute (WRI), the Environmental Liaison Centre International (ELCI), the Consultative Group on International Agricultural Research (CGIAR), the African Centre for Technology Studies (ACTS), the Environmental Defense Fund, Greenpeace, the Third World Network, Birdlife International, and the German Non-Governmental Organizations Forum.

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I. GENERAL OVERVIEW

A. Biodiversity and sustainable development

4. Biological diversity - biodiversity for short - refers to the variety and variability of all plants, animals and micro-organisms that exist on earth and the ecological complexes of which they are part as well as the way in which they interact with one another and with their physical surroundings, including ecosystems diversity, species diversity and genetic diversity. In short, biological diversity is the variety of all life and natural processes. Biodiversity is a key provided by nature for opening up sustainable development opportunities. The biological resources of genes, species and ecosystems are essentially renewable resources; if managed effectively, they can create the basis for sustainable development. Conservation of biodiversity is therefore critical for the very survival of humankind. It lies at the heart of the key sustainable development issues, such as food security, human health and sustainable livelihoods. High agricultural and forest productivity and sustainability depend on the vital activities and the genetic diversity of diverse biota composed of an estimated 10 million (range 5-100 million) species of plants, animals and micro-organisms. Wild and domesticated components of biodiversity enable us to meet many of our daily needs for food, shelter, medicines and industrial products. Such basic commodities as wool, leather, cotton, silk, timber, rattan, resins, gums, rubber, meat, potatoes, maize, rice, wheat, bananas, medicinal plants, cocoa, tea and coffee are just a few typical components of biodiversity that are too often taken for granted. Without these raw materials, it would be impossible to sustain such human livelihoods as agriculture, forestry and fisheries, and improvements in pharmaceutical products and health care would be seriously hampered.

5. The underlying motivation for conserving biological diversity and using its components sustainably is thus deeply rooted in concern for the well-being and sustainable development of people. Biodiversity should be perceived not only in terms of conservation and science but also in terms of economics and resources, as a sustainable development issue. Consequently, actions geared to conserving biodiversity must be fully integrated both into overall national plans for sustainable development and into related sectoral plans (e.g., agriculture, forestry, marine, rural development and land use plans).

6. The conservation of biological diversity and the sustainable use of biological resources cut across a wide spectrum of the issues addressed in Agenda 21, including important economic and other human activity, such as promoting sustainable agricultural production and rural development (chap. 14); managing fragile ecosystems (chap. 13); protection of the oceans and the marine environment and the management and sustainable development of coastal areas (chap. 17); protection of freshwater resources (chap. 18); combating deforestation and desertification (chaps. 11 and 12); combating poverty (chap. 3); environmentally sound management of biotechnology (chap. 16); the role of indigenous people and their communities (chap. 26); and changing consumption patterns (chap. 4). Consideration of the issues contained in these chapters can be productive only if biodiversity concerns are taken into account.

7. Chapter 15 of Agenda 21 also cuts across macroeconomic policy issues, such as external indebtedness and the net transfer of resources (chap. 33), which support wasteful consumption patterns (chap. 33), as well as demographic dynamics (chap. 5) and trade and the environment (chap. 2). Activities under chapter 15 and related chapters of Agenda 21, together with measures contained in the Convention on Biological Diversity and other relevant legal instruments and agreements, thus need to be integrated into political, social and economic policy-making at every level. This was envisaged in paragraph 15.5 (b) of Agenda 21 (on the development of national strategies) and further elaborated in chapter 8 (Integrating environment and development in decision-making). The priority needs of developing countries for sustainable economic growth and the eradication of poverty need to be taken fully into account. As users of biological resources, people - especially indigenous people and local communities - need to be recognized as the front-line managers of biodiversity.

8. Given the critical importance of biological and genetic resources for the attainment of sustainable development and for the well-being of humankind, it is worth recalling that the steady erosion of biodiversity is largely the result of human activity. Despite mounting efforts over the past two decades to halt or even reverse this trend, the loss of the world's biodiversity has continued unabated. If a determined and concerted effort is not undertaken immediately to implement the commitments entered into at the United Nations Conference on Environment and Development (UNCED) in a coordinated and coherent manner, not only will the loss of species continue (currently estimated at between 20,000 and 50,000 species per year), but activities in the key socio-economic sectors mentioned above could be seriously undermined by the deterioration or permanent loss of their raw materials.

B. The loss of a valuable asset

9. The value of maintaining biodiversity for sustainable development is gradually being realized, and steps are being taken to conserve habitats, species and genetic resources. The increasing attention this issue has received has also served to underline how little is known about the scope and value of biodiversity on Earth. The lack of knowledge falls into two major areas. In the first place, neither the total number of living species that exist today, nor the number of those that have disappeared during the past few centuries is known. For all the positive good that biodiversity promises for improving the lives of human beings, scientists are not yet in a position to estimate the number of species or organisms on the Earth to an order of magnitude. There is a wide variation among estimates of the total number of species in the world. To date, while only 1.7 million species of plants, animals and micro-organisms have been described world wide, estimates of the total number of species on Earth range from 5 to 100 million or even more, 10 million being a conservative estimate. It is estimated that extinction is currently proceeding at the rate of 30 to 300 species per day, although that is only a crude conjectural assessment; there are few areas of science of such direct relevance to human beings about which so little is known. Agenda 21 made a contribution to redressing this gap in scientific knowledge by calling for the production of regularly updated world reports on biodiversity based upon national assessments in all countries (para. 15.7 (b)). The third session of the Commission on

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Sustainable Development should provide a valuable opportunity to review progress made in this important area. In the second place, the true value, especially in economic and resource terms, and the full extent of the current and future potential uses of biodiversity remain unknown.

10. Mainly because biodiversity comprises many components and because of the dearth of scientific and other data, it is extremely difficult to determine the total economic and ecological value of the range of goods and services that biodiversity provides. For these and other reasons, economic systems and policies fail to ascribe a value to biodiversity. This constitutes one of the major causes of biodiversity loss. Assessments of the value of biodiversity are often based on the value of products derived from agricultural crops, fisheries and wild species, and the genetic variation within them (i.e., from biological resources used directly to generate income). For example, agriculture accounted for 32 per cent of the gross domestic product (GDP) of low-income developing countries and 12 per cent of the GDP of middle-income countries in 1989. Trade in agricultural products amounted to US$ 3 trillion, while fisheries contributed 100 million tons of food world wide in the same year.

11. Wild species and the genetic variation within them make contributions to agriculture, medicine and industry worth many billions of dollars per year. So-called "consumptive use values" (from resources that are consumed directly without passing through a market) are often the foundation of community welfare in rural areas. For example, firewood and dung provide over 90 per cent of the total primary energy needs in Nepal, the Republic of Tanzania and Malawi, and exceed 80 per cent in many other countries. One study of four indigenous Amazonian Indian groups found that they used from half to two thirds of all forest trees as food, construction material, raw material for other technology, and medicinal and trade goods (virtually all species were used as firewood or as food for harvested animals). Conventional measures of economic performance, such as gross national product (GNP), have tended to ignore this very extensive use when calculating the annual income of such groups, even though the value of replacing such goods from other sources would be considerable.

12. In Africa, harvested species help feed rural people, especially the poorest villagers living in the most remote areas. In Botswana, over 50 species of wild animals provide animal protein exceeding 90 kilograms per person per year in some areas: over 3 million kilograms of meat are obtained yearly from springhare (Pedetes capensis) alone. In Ghana, about 75 per cent of the population depends largely on traditional sources of protein supply, mainly wildlife, including fish, caterpillars and snails. In Nigeria, game constitutes about 20 per cent of the mean annual consumption of animal protein by people in rural areas (including 100,000 tonnes of the two giant rat species (genus Thrynomys) known as "grasscutters"). In Zaire, 75 per cent of the animal protein consumed comes from wild sources.

13. The term "productive use value" is assigned to products that are harvested commercially for exchange in formal markets and is therefore often the only value of biological resources reflected in national income accounts. Productive use of such biological products as fuelwood, timber, fish, animal skins, musk, ivory, medicinal plants, honey, beeswax, fibres, gums, resins, rattans,

construction materials, ornamentals, animals sold as game meat, fodder, mushrooms, fruits and dyes, can have a major impact on national economies.

14. Such values can be remarkably high. It has been estimated that 40 per cent of the world market economy is based upon biological products and processes. Some 4.5 per cent of GDP in the United States of America is attributable to the harvesting of wild species, estimated to have amounted to some US$ 87 billion per year between 1976 and 1980. The percentage contribution of wild species and ecosystems to the economies of developing countries is usually far greater than it is for industrialized countries. Timber from wild forests, for example, is the second leading foreign-exchange earner for Indonesia (after petroleum) and throughout the humid tropics, Governments have based their economies on the harvest of wild trees: total exports of wood products from Asia, Africa and South America averaged US$ 8.1 billion per year between 1981 and 1983.

15. While market prices represented by productive use value can be an important indicator of value, they are not always an accurate representation of the true economic value of the resource and do not deal effectively with the questions of distribution and equity. It is also apparent that consumers may value resources differently: when they are admiring scenic beauty, they value tropical forests in a different way from when they are consuming timber products. The methodology for defining and relating these different valuations is still being developed.

16. In addition, species without consumptive or productive use may nevertheless play an important role in ecosystems, supporting species that do have such uses. In Sabah, Malaysia, for example, recent studies suggest that high densities of wild birds in commercial Albizia plantations limit the abundance of caterpillars that would otherwise defoliate the trees: the birds require natural forest for nesting.

17. All species form part of an ecosystem. Ecosystems in turn provide services of considerable value to humans. These services are often regarded as "public goods" that benefit the entire community or the whole world but are seldom evaluated in economic terms.

18. Moreover, as has been demonstrated in Nepal, while such benefits may be enjoyed within the country itself, many benefits from conservation are realized outside the country's borders in forms as diverse as reduced flooding because of the protection of upland forests, the supply of medicinal plants and genetic material, or the pleasure given to international tourists. For these reasons, the costs of conserving biological diversity need to be shared internationally. The current evidence of the impact of human activities on natural ecosystems suggests that far greater investments are required in order to maintain the continued productivity of these ecosystem services.

19. Information is gradually accumulating on the economic benefits derived from using genetic diversity to improve crop production by conventional breeding, and on the use of plant-derived drugs.

20. In Asia, by the mid-1970s, improvements using genetics had increased wheat production by US$ 2 billion and rice production by US$ 1.5 billion per year,

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through the incorporation of dwarfism into both crops. A "useless" wild wheat plant from Turkey was used to ensure disease resistance to commercial wheat varieties worth US$ 50 million annually to the United Sates of America alone. One gene from a single Ethiopian barley plant now protects California's US$ 160 million annual barley crop from yellow dwarf virus. Major cultivars of crops improved by wild genes have a combined farm sales import value of US$ 6 billion a year in the United States of America. An ancient wild relative of corn from Mexico - a perennial that is resistant to seven major corn diseases and can grow at high elevations in marginal soils - can be crossed with modern annual corn varieties, with potential savings to farmers estimated at US$ 4.4 billion annually world wide.

21. Of all the useful plant-derived drugs, only 10 are synthesized in the laboratory: the rest are still extracted from plants. Traditional medicine forms the basis of the primary care for about 80 per cent of the 3 billion inhabitants of the developing countries. The retail value of plant-derived drugs was estimated at US$ 43 billion in 1985 in the industrialized countries and it is estimated that markets for herbal drugs in those countries could reach US$ 47 billion by the year 2000. In 1960, a child suffering from leukaemia had only one chance in five of survival; today, that child has four chances in five, due to treatment with drugs containing active substances discovered in the rosy periwinkle (Catharanthus roseus), a tropical forest plant originating from Madagascar. Commercial sales of drugs from this plant now total around US$ 100 million a year world wide. With advances in plant biotechnology and the availability of new and precise screening tools, current interest in plants as a source of raw materials for developing new medicinal products is expanding.

22. Many natural ecosystems provide benefits that are indirect and have economic value through services rather than products. Most such benefits will fall into one or another of the following categories: (a) the photosynthetic fixation of solar energy, which transfers solar energy through green plants into natural food chains, thereby providing the support system for species that are harvested; (b) ecosystem functions involving reproduction, such as pollination, gene flow and cross-fertilization, the maintenance of environmental forces and species that influence the acquisition of useful genetic traits in economic species, and the maintenance of evolutionary processes, leading to constant dynamic tension among competitors in ecosystems; (c) maintaining water cycles, including recharging groundwater, protecting watersheds and buffering extreme water conditions, such as flood and drought; (d) the regulation of climate conditions, both macro-climatic and micro-climatic, including influences on temperature, precipitation and air turbulence; (e) the production of soil and the protection of soil from erosion, including the protection of coastlines from erosion by the sea; (f) the storage and cycling of essential nutrients, such as carbon, nitrogen and oxygen, and the maintenance of the oxygen-carbon dioxide balance; (g) the absorption and breakdown of pollutants, including the decomposition of organic wastes, pesticides, and air and water pollutants; and (h) the provision of the recreational/aesthetic, sociocultural, scientific, educational, spiritual and historical values of natural environments.

23. Biodiversity also has certain sociocultural values: many plants and animals have sociocultural and religious attributes that bestow a special status

on them. Some plant parts are used as symbols of peace or war or to attain protective charms, giving them special religious importance.

24. The study of the physical or biological nature of plants and animals has led to the accumulation of useful, basic, scientific knowledge, which has in turn laid the foundation for further advancement and to further discoveries.

C. The United Nations Conference on Environment and Development: a new challenge to conservation and the sustainable use of biodiversity

25. The objectives and activities contained in chapter 15 of Agenda 21 represent, therefore, a formidable challenge to Governments and relevant United Nations bodies, major groups and non-governmental organizations, among others, to improve the conservation of biological diversity and promote the sustainable use of biological resources, as well as to support the Convention on Biological Diversity and other relevant agreements in a coordinated and integrated manner.

26. Prior to UNCED, a number of entities within the United Nations system and among the non-governmental organizations were directly involved in issues related to the conservation of biodiversity and the sustainable use of biological resources; these organizations have cooperated in a series of related programmes and activities to address the loss of biodiversity. The work of the United Nations system and the non-governmental organizations was explicitly recognized by UNCED, which directed that Agenda 21 should take full account of and build upon the work already being carried out on biodiversity.

27. Most of these programmes and activities have continued since UNCED and provide inputs to the implementation of chapter 15 and related chapters of Agenda 21, together with the Convention on Biological Diversity and related agreements and action plans. The main thrust of the effort called for in chapter 15 is focused upon activities at the national level, supported, as appropriate, by entities within the United Nations system and other bodies. Thus, within the United Nations system, much work has been undertaken to assist countries, especially developing countries, with the planning and management of biodiversity. Entities within the United Nations system and non-governmental organizations are also collaborating to strengthen national capacities for undertaking biodiversity programmes. Among the activities and programmes under way are the preparation of national biodiversity studies, strategies and action plans.

28. The Convention on Biological Diversity and other related agreements will be the principal instruments for undertaking the conservation of biodiversity and the sustainable use of biological and genetic resources. In paragraph 15.7 (e) of Agenda 21, the international community is called upon to promote cooperation between the parties to relevant international conventions and action plans with the aim of strengthening and coordinating efforts to conserve biological diversity and the sustainable use of biological resources. The unprecedented rate of ratification of the Convention and its entry into force on 29 December 1993, which was rapidly succeeded by the first meeting of the Conference of Parties (Bahamas, 28 November-9 December 1994), have already

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served to demonstrate the commitment of the international community to the goals of the conservation and sustainable use of biological diversity and the fair and equitable sharing of any benefits arising from that use.

29. UNCED provided the impetus for countries to start taking the necessary steps for incorporating biodiversity issues into their development policies, processes and plans. However, since then few Governments have incorporated biodiversity concerns in their development and action plans and much still remains to be done to make the protection of biodiversity a reality.

30. A number of major initiatives have been taken to implement the Convention on Biological Diversity and Agenda 21, including the preparation of biodiversity country studies, strategies, and action plans, a global biodiversity assessment report, strengthening developing countries' capacities in biodiversity data management, the establishment of the Elephant and Rhinoceros Conservation Facility, the preparation of country action plans for the conservation of the African elephant and the African and Asian rhinoceros in key range States, and the establishment of the Global Tiger Forum (UNEP); the release of the Global Biodiversity Strategy (IUCN, WRI and UNEP); Global Marine Biological Diversity Strategy (the Centre for Marine Resources, IUCN, WRI and UNEP); Global Biodiversity: Status of the Earth's Living Resources (WCMC, UNEP, IUCN, WWF and WRI); the World Watch List for Domestic Animal Diversity (UNEP and FAO); the launch of the Programme Diversitas (UNESCO, IUBS and SCOPE); global biodiversity forums (IUCN, WRI and UNEP) and regional workshops on the Convention on Biological Diversity (UNEP); the creation of the System-wide Programme on Genetic Resources (SGRP) (FAO); the harmonization of the International Undertaking on Plant Genetic Resources (FAO); the convening of an international forum on the theme "Biodiversity, science and development: towards a new partnership" (IUBS and UNESCO); the preparation of the International Conference on Biosphere Reserves (UNESCO); and the establishment of the Global Environment Facility (GEF) to support, among others, national, regional and global biodiversity-related activities (World Bank, UNDP and UNEP).

II. REVIEW OF PROGRESS ACHIEVED: MAIN POLICY ISSUES AND EXPERIENCES

31. The assessment of progress achieved since UNCED in implementing chapter 15 of Agenda 21 (Conservation of biological diversity) reveals that most United Nations system activities relevant to chapter 15 are concentrated in the areas of management-related activities, human resources development, capacity-building, data and information, and international and regional cooperation. There is little or no evidence of major initiatives being undertaken on technology transfer or finance, issues that call for multi-agency responses. Some of the activities specified in chapter 15 also require large amounts of capital investment to achieve their objectives. Due to financial constraints and other reasons, most agencies appear to be continuing with their established work programme priorities although a special focus is being placed on biodiversity.

32. At the time of preparing the present report, information on country experiences was not yet available.

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A. Experiences of major groups and non-governmental organizations

1. Indigenous and rural communities

33. In the aftermath of UNCED, the contribution of indigenous and rural communities to the conservation and sustainable use of biodiversity and as innovators has been recognized but not necessarily fully understood. Indigenous peoples are to be found in diverse areas, including forests, all over the world.

34. The result of the innovative activity of farmers lies in their fields. For example, the Mende farmers of Sierra Leone, independent of foreign experts, conduct field trials, test new seeds against different soil types and compare results. In the Horn of Africa, Ethiopian farmers maintain variety performance records, sometimes inscribed on door posts. Farmers normally breed for specific micro-environments, but it is often the case that their local varieties can perform remarkably well in roughly similar environments in other parts of the world. Research institutes report the use of an Ethiopian farmer variety in Burkina Faso and a South African variety in Ethiopia. Rural societies maintain agricultural biodiversity because it is essential to their survival. They breed their own improved varieties for the same reason. For them, there is no useful distinction between conservation and development.

35. Minimizing risk is an important part of the livelihood strategies of rural communities. West Africa's Azande farmers actually increase both the number and the complexity of their crop experiments following poor harvests. Faced with striga weed infestation in their millet, farmers in Niger have sought out advice from other Sahelian communities with longer experience and have developed strategies to trap striga by inter-planting sesame. Formal sector researchers are now looking for and finding genuine inventiveness in rural communities, ranging from cassava cultivators in the Dominican Republic to potato growers in the Andes and rice farmers in the Philippines.

36. However, the cultivated fields and the domesticated crops and animals are just one part of the story. In fact, evidence is mounting that virtually all of the biodiversity within the reach of rural communities, be it in field or forest, has been nurtured or developed by community conservers and innovators. What are often called wild species are often an integrated part of farming systems and can be considered to form part of the intellectual achievements and contributions of rural societies. The Chacoba of Bolivia, for example, make use of almost four fifths of the woody species in their surrounding forests. The Ka'apor of Brazil use three quarters of their tree diversity, while in Venezuela the Panere use about half their documented diversity. All of them use between one fifth and one half of all woody species for food and up to one third for medicinal purposes.

37. The importance of so-called wild species to the food supply of rural communities is brought home by the Mende of Sierra Leone, who draw less than one fifth of their nutrition from cultivated species and more than half from forests, streams and fallow fields; the remainder comes from local markets and plantation crops. In the Bungoma District of western Kenya, almost half of all families incorporate wild species in their home gardens and only a marginally

lower percentage of families collect them for food in the forest. Because local communities rely on foods collected throughout their environment, distinctions between the biodiversity in agricultural and natural ecosystems are blurred. The maintenance of diversity in all ecosystems is important to meet the twin goals of conservation and livelihood security.

38. Despite their importance for livelihood security, these crops of local importance, farmer-developed varieties and wild foods are largely ignored by conventional agricultural and forestry research and development, which focuses attention on only a limited number of domesticated crops of global importance. Policy makers should ensure that new agricultural technologies and changing patterns of land use and land tenure do not reduce the availability of wild food resources or eliminate the use of local crops and varieties. On the contrary, appropriate policy incentives are needed to support the conservation and sustainable use of this important part of agricultural biodiversity.

2. Women

39. It is increasingly recognized that the empowerment of women is an essential component of sustainability; it is less well recognized that women have a special role in relation to the protection of biological diversity.

40. Women play a major part in the protection of biological diversity through their many roles and responsibilities. In the South, women act as resource managers. Women tend the fields and grow the food that feeds their families; in fact, women grow most of the food in Africa. They gather the firewood and raise the alarm when the forest dwindles. In the case of the Chipko movement in India, for example, the threat of deforestation was enough to rally the local women to civil disobedience to protect the ecosystem. They knew how closely their well-being was tied to that of the forest. They knew that the forest provided more than timber, that its dead limbs provided the heat to cook their meals, that the living biomass of the forest provided pure water and that the roots of the trees held the soil along the hillsides.

41. Sudanese farmer-breeders are usually women. Kayapo women in the Brazilian Amazon not only breed new crop varieties but also preserve representative samples in hillside genebanks. Tanimuka and Yukuma women in the Colombian Amazon have bred and preserved numerous clones of peach palm with spineless trunks and unusually large and seedless fruits. During the 1984 famine in the southern Sudan, Toposa women risked their own lives to hide the seeds for the next year's planting.

42. Other women around the world have also recognized the need, to not only protect biodiversity but also restore it. The Green Belt Movement in Kenya, involving over 80,000 women to date, maintains more than 1,000 nurseries where not just mono-cultural plantations but a variety of trees are planted to provide for human and non-human needs.

43. In many societies, women have led the resistance to the non-sustainable exploitation of resources. Penan women and children have spent weeks on logging blockades in Sarawak attempting to protect what is left of the world's oldest

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rainforests on the island of Borneo, where unsustainable logging has resulted in appallingly high rates of species extinction.

44. In the industrialized countries, women frequently head organizations and community movements for the protection of wilderness and biodiversity, and they also play a significant role as consumers. Millions of women (and men) in such countries are keenly aware of the need to reduce consumption and learn to live with consumption levels that do not stress the Earth's carrying capacity or deny large segments of humanity access to sufficient resources to meet their rudimentary needs. Some far-sighted corporations capitalize on and encourage the power of the consumer when they promote rainforest products in cosmetics and shampoos, thus assisting in maintaining biological diversity.

45. Consumer choice to avoid non-sustainably harvested products, whether from Canada's temperate rainforests or the Brazilian Amazon, changes the economic realities of doing business. But women in industrialized countries are not uniformly wealthy consumers; indigenous women in those countries often have a subsistence livelihood in which they are close to the land and its biodiversity. A. G'wichin, woman and founder member of the Yukon legislature, has dedicated herself to the protection of the land, particularly through opposition to the proposal from the previous United States Administration to open up the porcupine caribou calving grounds on the United States side of the border to oil and gas development. Meanwhile, Cree women of Canoe Lake in Saskatchewan spent months on Canada's longes running a blockade against clear-cut logging. And Innu women from Labrador have toured Canada seeking support for their struggle to stop low-level military flights over their territory, which threaten the world's largest remaining caribou herd and several endangered species.

46. It is critical that the role of women as resource managers, community activists, consumers and environmental advocates be recognized when strategies for the protection of biological diversity are being developed. Women should participate at the local, regional, national and international levels as plans are made to meet commitments under Agenda 21 and the Convention on Biological Diversity. As resource managers, women should be consulted and supported in what they are already doing to protect biological diversity. Protecting biological diversity should not be seen as something separate and apart from other human development priorities. It may just be that the role of women in protecting biodiversity will provide a bridge between environment and development on the path to sustainability.

3. Non-governmental organizations

47. Non-governmental organizations participated actively in the UNCED process; the negotiation of the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change; the FAO Commission on Plant Genetic Resources; and the ninth session of the Conference on the Parties to CITES. Their role, together with the entities within the United Nations system, was critical in raising the awareness of the need to conserve biological diversity and make sustainable use of biological resources. The meetings, workshops and other forums organized by the non-governmental organizations provide platforms for a better understanding of the issues and the linkages between biodiversity

and other sectoral and cross-sectoral issues of Agenda 21. They emphasize the role of indigenous people and their communities in biodiversity planning and management. On the basis of available information, the main activities of some major groups are summarized below.

48. The World Conservation Union (IUCN), in collaboration with WRI and UNEP, supports the organization of global biodiversity forums as an international mechanism for continuing dialogue and debate among people working in resource management, research, education, industry as well as policy makers, non-governmental organizations and community members residing near or within biodiversity important areas, concerning their options for action to save, study and make sustainable and equitable use of biodiversity.

49. The IUCN programme on biodiversity at the global, regional and national levels was organized under five major themes: (a) integrating biodiversity into national planning process; (b) providing advisory services and facilitating support on biodiversity issues to the Global Environment Facility (GEF), the World Bank, the regional development banks and UNEP, as well as national Governments; (c) developing policies on biodiversity; (d) supporting international programmes on biodiversity; and (e) supporting biodiversity components of other IUCN programmes. The increasing demands on the programme have far outweighed staff resources but IUCN was still able to secure a sound financial basis for 1993-1995 and began recruiting additional professional staff. Major achievements include the organization of global biodiversity forums, in collaboration with WRI and UNEP; an active outreach programme, including numerous publications and presentations; a significant contribution to the promotion of the implementation of the Convention on Biological Diversity at all levels; and a substantive review of the pilot phase of GEF.

50. The African Centre for Technology studies (ACTS) has been engaged in various policy research activities on biodiversity and related biotechnology, including (a) the organization of the first international conference on the Convention on Biological Diversity, on the theme "National interests and international imperatives"; (b) embarking on the analysis of the technological capabilities and institutional abilities of selected African countries for biodiversity management and biotechnology research and development; and (c) the exploration of institutional avenues and policy options for promoting the participation and enhancing the capabilities of local communities in the implementation of the Convention on Biological Diversity.

51. The Consultative Group on International Agricultural Research (CGIAR) continued to carry out research in partnership with national, regional and international genetic resources programmes as a means of strengthening the scientific basis for its work encompassing in situ and ex situ conservation and the sustainable use of plant, livestock and aquatic genetic resources. Capacity-building in national programmes and training were other key components of CGIAR activities.

52. Since 1975, CGIAR centres in collaboration with national institutions and United Nations bodies, such as FAO, UNEP, UNDP and the World Bank, have collectively assembled one of the world's largest ex situ collections of plant genetic resources: over 500,000 individual entries, held in the genebanks of

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11 centres. In addition, the CGIAR system has helped to conserve 140 plant species in the genebanks of 450 non-CGIAR institutions in over 90 countries. All of the genetic resource collections conserved at CGIAR centres are held in trust for the benefit of humankind and for the use of the scientific community world wide. The CGIAR genebanks provide raw materials for plant breeders, farmers and other users. Collectively, they distribute more than 600,000 samples of germplasm from the in-trust collections and breeding programmes each year to individuals and institutes in 120 countries. Agreements between the CGIAR centres and FAO to place the in-trust collections under the auspices of FAO were concluded in October 1994.

53. CGIAR has been carefully examining the role of its centres, particularly in light of Agenda 21 and the Convention on Biological Diversity, and in May 1994 CGIAR decided to establish the System-wide Genetic Resources Programme (SGRP), recognizing that integrating the current activities of many centres would greatly enhance transparency and accountability, as well as the impact of the CGIAR in its international efforts. SGRP thus comprises the independently managed genetic resources units and programmes of the individual centres, with IPGRI as the lead centre.

54. Through research, working in partnership with other organizations at the local, national and international levels, CGIAR also seeks to develop improved technologies, strategies and policies for both the in situ and ex situ conservation of plants and animals that are useful or potentially useful for agriculture, forestry and fisheries.

55. The World Resources Institute (WRI), in collaboration with ACTS and INBio (Costa Rica), has published a policy research report on the new and rapidly evolving legal and institutional mechanisms for regulating the exploration of wild plant, animal and microbial substances. The report offers guidelines to nations who need to develop domestic policies and legislation to regulate access and provide incentives for the exploration of biodiversity for potential uses. WRI is also collaborating with UNEP on the preparation of guidelines for the preparation of national biodiversity strategies and action plans with the aim of streamlining the various development and environmental plans and incorporating biodiversity goals and activities into sectoral and cross-sectoral plans.

56. The World Conservation Monitoring Centre (WCMC), a joint IUCN/WWF/UNEP venture, continued to compile and manage substantial global databases on threatened animals and plants, and published the 1993 United Nations List of National Parks and Protected Areas, Global Biodiversity: Status of the Earth's Living Resources, and the Biodiversity Map Library. WCMC, in collaboration with UNEP, provided technical support to many countries in the area of biodiversity information-gathering, dissemination and management.

B. Matters related to finance and technology

57. In paragraph 15.8 of Agenda 21, the UNCED secretariat estimated that the average total annual cost (1993-2000) of implementing the activities of chapter 15 was about $3.5 billion, including about $1.75 billion from the international community on grant or concessional terms. These are only

indicative figures and estimates of order of magnitude; actual costs depend on the specific strategies and programmes adopted by countries. Financing biodiversity-related activities is a central issue for the Convention on Biological Diversity and especially for GEF, which continues to mobilize financial resources for biodiversity activities.

58. Additional financial resources have been provided by GEF (US$ 303.5 million, excluding co-financing by the United States Agency for International Development (USAID)) for the purpose of the conservation and sustainable use of biological diversity. Various donors provided approximately US$ 3 million as additional resources to assist developing countries in the implementation of CITES, supporting mainly the capacity-building component, species surveys and management strategies.

59. The question of estimating the gap between financial requirements and available resources for financing activities relevant to chapter 15 of Agenda 21 is being addressed by the biodiversity country studies (UNEP). Issues related to the amount of financial resources needed for implementation of the Convention on Biological Diversity, as well as issues related to eligibility criteria and the institutional structure required to operate the financial mechanism created under the Convention were considered by the Conference of the Parties at its first meeting (Nassau, the Bahamas, 28 November-9 December 1994). The interim secretariat of the Convention prepared a useful paper on methodologies for estimating the funding needs of multilateral biodiversity assistance between 1993 and 2000, as well as a paper on incremental costs. The lack of transparency in financial mechanisms and the excessive amount of time needed to access them are causes for concern.

60. Many United Nations bodies and non-governmental organizations have reviewed their programmes in relation to Agenda 21 and the Convention on Biological Diversity and have increased their financial support for relevant activities at the national, regional and global levels. The precise total figure of additional resources has not been estimated. Resources currently available, however, do not come anywhere near meeting current biodiversity conservation needs. If biodiversity concerns are to be adequately met, a radical change of view will be required among key decision makers. Biodiversity needs to be seen as a political priority not only in terms of its conservation but also for the potentially valuable contribution it can make to the improvement of peoples' lives, especially in developing countries.

61. Apart from GEF, the financial mechanisms that are in place and that are being utilized by Governments and institutions for biodiversity activities continue to encompass traditional sources of funding, namely:

(a) National government budgets, incorporating locally sourced funds that face fierce competition from other developmental priorities;

(b) Official development assistance (ODA) obtained by Governments through bilateral/multilateral agreements;

(c) Non-governmental organizations funding arrangements, sometimes with (but often without) the due involvement of national Governments or the participation of local counterpart non-governmental organizations;

(d) Private sector investments, incorporating varying degrees of investments by foreign-based transnational corporations (TNCs) involved in bio-prospecting.

62. Based on General Assembly resolution 44/228 and the commitments entered into at UNCED, developing countries had great expectations concerning financial transfers from North to South through ODAs, international NGOs and TNCs; the level of actual transfers, however, has been far less than was expected.

63. In Agenda 21 and the Convention on Biological Diversity, a clear link was recognized between the supply of genetic resources, on the one hand, and access to and the transfer of technologies that help characterize, evaluate, conserve and make use of those resources, on the other. This implies the need for the development of creative partnerships among nations and between the public and private sectors, by means of which nations and institutions can establish collaborative ventures for technology transfer; technology can then be acquired and adapted through conventional programmes, such as training, information exchange and access to patent information.

64. The application of environmental policies and/or economic instruments to stimulate the development, transfer and dissemination of appropriate technologies in support of the conservation of biological diversity and the sustainable use of biological resources featured prominently during the negotiation of the Convention on Biological Diversity. An indicative list of transferable technologies and know-how related to the implementation of the Convention (see UNEP/CBD/IC/2/11) 6/ was prepared by the Open-ended Intergovernmental Meeting of Scientific Experts on Biological Diversity for the Subsidiary Body on the Scientific, Technical and Technological Advice (SBSTTA), and a description of appropriate models for access to and the transfer of technology is expected to feature in the medium-term plan of the Conference of the Parties. The Meeting also prepared four papers to provide a basis for developing appropriate models of mechanisms for access to and transfer of the relevant technologies on the following topics: (a) ways and means of promoting the development and/or transfer of innovative, efficient and state-of-the-art technologies relevant to the conservation and sustainable use of biological diversity; (b) ways and means of integrating into modern management the practices of indigenous and local communities that embody traditional lifestyles; (c) scientific and technical programmes for training in conservation and the sustainable use of biological diversity at the regional, national and local levels; and (d) technologies and know-how for data collection, management and transfer. The Intergovernmental Committee on the Convention on Biological Diversity (ICCBD), at its second meeting in June 1994, made recommendations that may facilitate the establishment of a clearing-house mechanism for technical and scientific cooperation within the Convention.

65. Each country should assess its technological capability, determine its needs and decide on how much to invest in technology transfer, including biotechnology development, as well as how to integrate technology development

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into national development strategies. The relevance of each technology to the conservation and sustainable use of biodiversity should be carefully assessed in technology transfer arrangements. Special attention should be paid to the likely socio-economic impacts of such technologies, and to the need to duly recognize, reward, document and develop the knowledge, innovations and practices of indigenous people and local communities, and integrate them into modern management practices.

66. The protection conferred by intellectual property rights in general and by patents in particular is considered to be an effective means of promoting technology, development and transfer for which adequate human and financial resources are essential. However, while legislation on intellectual property rights is well developed or in place in many developed countries and is under consideration in a few developing countries and some of the economies in transition, there are no international legal instruments or standards that adequately recognize the rights of indigenous and local communities and farmers over their knowledge, technologies and innovations.

C. Recent developments and experiences in international cooperation

1. Intergovernmental processes

(a) Convention on Biological Diversity

67. The Convention on Biological Diversity entered into force on 29 December 1993 and is in the process of being effectively implemented. By 18 December 1994, 167 States and the European Community had signed and 107 States had ratified the Convention, which assured the widest possible representation of countries in the first meeting of the Conference of the Parties. UNEP, in collaboration with UNESCO and FAO, continued to provide scientific and technical support to the secretariat of the Convention and to facilitate intergovernmental consultations through the meetings of ICCBD and the first meeting of the Conference of the Parties.

68. The first meeting of the Conference of the Parties (Nassau, the Bahamas, 28 November-9 December 1994) provided, *inter alia*, an opportunity to outline a programme of work for advancing the objectives and provisions of the Convention, as well as to set the stage and establish the mechanisms needed for its implementation. The decisions adopted by the Conference are described below.

Rules of procedure for meetings of the Conference of the Parties

69. The Conference of the Parties adopted its rules of procedure, with the exception of paragraph 1 of rule 40, which deals with voting procedures on matters of substance.

Financial resources and mechanisms

70. The Conference adopted policy, strategy and programme priorities, as well as eligibility criteria for access to and utilization of financial resources,

and a list of developed country Parties and other Parties that voluntarily assume the obligations of contributing financial resources to the Convention Trust Fund. Programme priorities are mainly based on national priorities, including capacity-building to facilitate the preparation and implementation of national strategies, plans and programmes. The Conference also decided that the restructured GEF should continue to serve as the institutional structure for operating the financial mechanism under the Convention on an interim basis, and that the restructured GEF should be instructed to take prompt measures to support programme priorities and eligibility criteria for access to and utilization of financial resources as the Conference had defined them. The Conference also adopted the financial rules for the administration of the Convention Trust Fund and the 1995 budget of US$ 4.8 million to fund activities under the secretariat of the Convention.

Clearing-house mechanisms for technical and scientific cooperation

71. The Conference of the Parties requested the secretariat of the Convention to prepare a comprehensive study containing concrete costed recommendations to assist the Conference of the Parties in the establishment of the clearing-house mechanism.

Selection of a competent international organization to carry out the functions of the secretariat of the Convention on Biological Diversity

72. The Conference of the Parties selected UNEP to carry out the functions of the secretariat of the Convention.

Subsidiary Body on Scientific, Technical and Technological Advice

73. The Conference decided that the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) should operate in accordance with the terms of reference contained in article 25, paragraphs 1 and 2 of the Convention until the Conference could further elaborate them. SBSTTA was requested to prepare a proposal for its medium-term programme of work based on the priorities set in the programme of work of the Conference of the Parties and on article 25 of the Convention, and to develop/establish its modus operandi at its first meeting (to be held at UNESCO headquarters in Paris, 4-8 September 1995). SBSTTA was requested, in particular, to consider the following matters, on which it was requested to advise the Conference of the Parties at its second meeting:

(a) Alternative ways and means for the Conference of the Parties to start the process of considering the components of biological diversity, particularly those under threat, and for identifying action that could be taken under the Convention;

(b) Ways and means of promoting and facilitating access to technology, as well as its transfer and development;

(c) Scientific and technical information for inclusion in national reports on measures taken to implement the provisions of the Convention and the effectiveness of such measures in meeting the objectives of the Convention;

(d) Scientific, technical and technological aspects of the conservation and sustainable use of coastal and marine biological diversity.

Preparation of the participation of the Convention on Biological Diversity in the third session of the Commission on Sustainable Development

74. The Conference of the Parties requested its President to transmit a statement on its behalf to the high-level segment of the third session of the Commission on Sustainable Development. In the statement, the Conference noted that the Convention on Biological Diversity was the primary international legal instrument for advancing the conservation and sustainable use of biological diversity and the fair and equitable sharing of benefits arising out of the use of genetic resources. The Conference noted the importance that it attached to the development of a substantive relationship with the Commission on Sustainable Development given its responsibility in respect of Agenda 21 and the complementarity of its mandate with that of the Conference of the Parties. The Conference appealed to the Commission to make all efforts in its own right to advance the concerns of the Convention. In addition to addressing particular sectoral issues on the agenda of the Commission at its third session, the Conference stressed that biological diversity was a cross-cutting issue that was relevant to virtually all Commission concerns. The statement also noted the decisions taken by the Conference of the Parties at its first meeting, as well as its medium-term programme of work.

Medium-term programme of work of the Conference of the Parties 1995-1997

75. The Conference also adopted its medium-term programme of work (1995-1997), which provided a systematic, year-by-year approach to routine items, as well as new thematic matters that the Conference wished to deal with in the future. Standing items included, inter alia, the conservation of threatened components of biological diversity and items related to access to genetic resources, technology transfer and handling biotechnology. The Conference took into account the deep concern and interest of the Parties about the need for the safe transfer, handling and use of all living modified organisms resulting from biotechnology so as to avoid any adverse effects on the conservation and sustainable use of biological diversity. It decided to establish an open-ended ad hoc group of experts to consider without undue delay the need for and modalities of a protocol, containing appropriate procedures to be followed in the field of the safe transfer, handling and use of any living modified organism resulting from biotechnology that might have an adverse effect on the conservation and sustainable use of biological diversity.

Location of the secretariat of the Convention on Biological Diversity

76. The Conference of the Parties agreed to postpone a decision on the location of the secretariat of the Convention to the second meeting; the Conference outlined some of the details Governments might wish to include in their offers to host the secretariat.

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International Day for Biological Diversity

77. The Conference of the Parties recommended to the General Assembly that it adopt 29 December, the date of entry into force of the Convention on Biological Diversity, as International Day for Biological Diversity; the General Assembly accordingly adopted that Day at its forty-ninth session.

(b) Convention on International Trade in Endangered Species of Wild Fauna and Flora

78. At the ninth meeting of the Conference of the Parties of CITES (Fort Lauderdale, Florida, 7-18 November 1994), 118 of the 124 Parties to the Convention were present. During the meeting, a strategic plan stressing the priorities that should be implemented during the next three years was adopted, as well as listing criteria for including species in the specific appendices to the Convention. By consensus, Governments requested the secretariat of the Convention to make sure that a close cooperation with the interim secretariat of the Convention on Biological Diversity was developed, since the linkages between the two conventions were of major importance to the successful achievement of sustainable development. It was also stressed that CITES should strengthen its cooperation with other trade agreements, such as the General Agreement on Tariffs and Trade (GATT), the International Tropical Timber Organization (ITTO), the International Wheat Council (IWC), and the International Commission for the Conservation of Atlantic Tunas (ICCAT). The important role played by non-governmental organizations in recent years in the implementation of CITES was also noted. The budget and work plan were approved, and Governments placed great emphasis on the need for GEF partners to recognize CITES as an important area for financing through the biodiversity portfolio.

(c) Climate change and desertification conventions

79. Recognition of the world as truly one major interconnected ecosystem has increased appreciation that actions in one area affect human well-being and ecosystem health elsewhere. Deforestation and fossil-fuel burning, for example, contribute to climate change through global warming. Ecological effects on biological diversity due to climate change and desertification will amplify the impacts that are already being imposed on natural ecosystems by humans. Many species, such as migratory species, species dependent on the timing of ice-melting, Arctic communities, marine, coastal and peripheral populations, genetically impoverished species, mountain and alpine communities, and species that inhabit dry lands, semi-arid and arid ecosystems, are all likely to be adversely affected by global warming; the climatic changes predicted may bring about catastrophic losses in genetic resources and species and ecosystem diversity.

80. The loss of biological diversity is particularly important in dry lands, where natural habitat and native vegetation are often the sole livelihood of farmers and pastoralists. The degradation of dry lands poses a threat to biological diversity and the carrying capacities of those lands. Some of the most important crops originated in dry lands, such as wheat, barley, sorghum, millet, many pulses and cotton, as well as animals that have become closely linked to the development of human civilization, such as the horse, the sheep,

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the goat, the cow, the camel and the lama. Moreover, close to 1 billion people inhabit dry lands. When a dry-land species adapted to dry conditions is lost, it is very likely that it is lost for ever; because species and genes well adapted to drier areas are so rare, such loss is immeasurable.

81. The implications of the loss of biodiversity at all the above-mentioned levels are serious and ominous; such loss has consequences both for the species that is threatened or made extinct and for the habitats that are degraded and become desertified and unable to function properly. Global warming could indeed play havoc with the world's living organisms, affecting humanity itself. Many species that inhabit islands, floodplains or coastal areas, including some human populations, may not be able to redistribute themselves fast enough to keep up with the projected climatic changes. Many of the islands could well be completely submerged, with complete loss of their flora and fauna. Both the United Nations Framework Convention on Climate Change and the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa have direct intimate linkages to the Convention on Biological Diversity; mechanisms for cooperation between and among them should therefore be established.

(d) International undertaking on plant genetic resources

82. The FAO Commission on Plant Genetic Resources (PGR), at its fifth session (April 1993), recognized that the Convention on Biological Diversity, once operative, would play a central role in determining policy on PGR in the future. If the Convention decided to adopt a protocol on PGR, the Commission would play a major role in developing such a protocol, in full cooperation with the Conference of the Parties of the Convention. The Commission stated that such a protocol might be served by its own governing body, secretariat and financial mechanism.

83. At its extraordinary session (7-11 November 1994), the Commission initiated the revision of the Undertaking on Plant Genetic Resources, in particular the consolidation of its text and annexes in harmony with the Convention, and the inclusion of issues relevant to access to plant genetic resources for food and agriculture and the implementation of farmers' rights. In that regard, the Commission noted that negotiations would be in the hands of Governments and that revision of the Undertaking should be carried out carefully. Throughout the process, communication should be maintained between the Commission and the Convention and subsequently the Conference of the Parties of the Convention. At a later stage, the Conference of Parties might consider the desirability of transferring the revised undertaking into a protocol. The revision process would be an integral part of the preparatory process of the International Technical Conference on the Conservation and Utilization of Plant Genetic Resources (to be held in Leipzig, Germany in 1996). It is intended to conclude the negotiations of the revised Undertaking in early 1996.

2. United Nations system

84. Since UNCED, much work has been done by organizations and bodies of the United Nations system in support of Agenda 21 and the Biodiversity Convention (see annex for details).

III. CONCLUSIONS AND PROPOSALS FOR ACTION

A. Conclusions

85. As noted, the direction taken by relevant entities within the United Nations system in the area of biodiversity has focused upon activities at the national level, supplemented as appropriate by regional programmes and international activities. The Convention on Biological Diversity and other related agreements will continue to be the principal instruments for undertaking and ensuring the effective conservation and sustainable use of biological and genetic resources, and the fair and equitable distribution of its benefits. The Commission on Sustainable Development should respond to the constructive statement from the Conference of the Parties to the Convention by encouraging further development of the links established with the Convention and by lending support to the Convention as the lead entity in coordinating existing relevant agreements at the global and regional levels. In this regard, particular attention should be paid to the requirements contained in paragraph 15.7 (f) of Agenda 21, as well as to the management-related activities indicated in paragraphs 15.5 (c), (d) and (e), which would underpin the successful formulation and implementation of the national strategies, plans or programmes called for in article 6 of the Convention.

86. Since UNCED, there appear to have been no major initiatives on the issues of technology transfer and financial mechanism(s) that would ensure or guarantee the new and additional financial resources required by developing countries. These are issues that require urgent intergovernmental and multi-agency responses.

87. The active participation of non-governmental organizations in the UNCED process, as well as in the negotiation process for the conventions on biological diversity and climate change, was critical in raising public awareness on crucial issues and linkages among the respective conventions, other related agreements, and various sectoral and cross-sectoral issues of Agenda 21. Their critical role should continue to be recognized and their participation should be more fully supported, especially at the national and regional levels.

88. In addition, some of the issues that still need to be addressed include (a) the harmonization of principles and obligations at the global, regional and national levels; (b) implementation of methods and procedures for better understanding and identification of the various components of biodiversity, through the regular update of fauna and flora inventories, and the conservation and management of indigenous species (domesticated and cultivated); (c) the mobilization and exchange of information relevant to conservation and the sustainable use of biodiversity; (d) the coordinated promotion of public awareness at the local, national and international levels; and (e) the

determination of the potential impact of intended projects and programmes on the delicate balance and well-being of fragile and complex ecosystems world wide. Assessment of social dimensions and human impacts is a prerequisite for the successful sustainable use and conservation of biodiversity.

89. Significant progress, however, has been made on most of the issues pertaining to the Convention on Biological Diversity, and a solid foundation was laid for the work of the Conference of the Parties, at its first meeting in the Bahamas, towards the effective participation of the Convention at the current session of the Commission on Sustainable Development.

B. Proposals for action

90. Based on the information provided above, it is clear that for chapter 15 of Agenda 21 to be fully and effectively implemented, work will need to be undertaken on various issues of cooperation and coordination, joint programming and delivery mechanisms, information exchange and policy reforms, as described below.

1. Cooperation programmes and collaborative arrangements

91. Governments need to develop mechanisms for appropriate coordination among biodiversity action plans and the multitude of other action plans and strategies called for by various treaties and international institutions, as well as the monitoring of their implementation and reporting on progress made. Within their national biodiversity strategies and action plans, where these exist, countries should identify priorities for regional and international action.

92. Governments in cooperation with the United Nations system, intergovernmental and non-governmental organizations, and in full partnership with indigenous peoples and their communities and other local communities, taking into consideration their role in the conservation, management and sustainable use of biodiversity, need to examine the impact of existing land-tenure systems on biodiversity conservation, and to develop, adopt and strengthen relevant national arrangements for supporting the best possible land-tenure systems that facilitate the active involvement and participation of local communities in biodiversity conservation activities.

93. Biodiversity should be treated as a cross-sectoral issue. The Commission on Sustainable Development may wish to examine ways to ensure that a concerted effort is made to develop common strategies for coordinating the implementation of chapter 15 of Agenda 21 with other relevant portions of Agenda 21 and the Convention on Biological Diversity (e.g., by identifying policy issues, respective areas of competence, future action required and monitoring and evaluating progress).

94. Governments, in cooperation with governmental and non-governmental organizations, need to develop elements and mechanisms for species-specific and ecosystem/area-specific strategies, including scientific research into the

conservation and sustainable use of biodiversity, and also need to facilitate access to relevant technologies.

95. Further efforts should be made by entities within the United Nations system to collect and update information on their financing needs for the implementation of Agenda 21 activities in the area of conserving biodiversity.

2. Information exchange and networking

96. Governments, entities within the United Nations system, and intergovernmental and non-governmental organizations need to collect, analyse and disseminate more reliable and adequate data, and to develop monitoring mechanisms for measuring achievements made at the national, regional and global levels. Attempts should be made to remedy the acute shortage of information available in developing countries on the status of their national biodiversity, a deficiency that impedes the development of monitoring and sound management; in-country networks and national reports based on biodiversity country studies could be useful mechanisms in this regard. To that end, networking among those concerned should be promoted, with common strategies and joint programming and implementation of activities.

3. Education, science, human resources development, technology transfer and capacity-building

97. The requisite scientific, technical and managerial capacities for implementing national biodiversity strategies, plans or programmes in response to Agenda 21 have still not been developed, even though the political commitment was made at UNCED to financially support biodiversity activities. Developed countries and relevant international organizations need to establish effective mechanisms for improving both the human and institutional capacities of developing countries, through joint programming for capacity-building at the national and regional levels. Particular attention is drawn to paragraph 15.11 of Agenda 21, which calls for existing institutions to be strengthened and for new ones responsible for the conservation of biological diversity to be established, and for consideration to be given to the development of mechanisms such as national biodiversity institutes or centres.

98. The international scientific community, in cooperation with Governments, entities within the United Nations system, and intergovernmental and non-governmental organizations, need to make efforts to develop economic tools for determining the costs and benefits of the conservation of biodiversity and sustainable use of biological resources, and their distribution at the local, national, regional and global levels.

4. Policy reforms

99. Governments need to undertake activities aimed at the restructuring and reforming of national policies, the development of incentive measures and the revision of existing and/or the development of new legislation to realize the

objectives of Agenda 21 and the Convention on Biological Diversity. Efforts should be made by the entities of the United Nations system, among others, to assist Governments in this regard. To that end, entities within the United Nations system should adjust their programmes and activities in line with Agenda 21 and the Convention on Biological Diversity, and should develop joint collaborative programmes and projects to promote the integrated development, sustainable use and conservation of biological diversity.

100. Governments, in cooperation with relevant entities within the United Nations system and the Convention on Biological Diversity, should initiate studies and discussions on the impact of intellectual property regimes related to genetic material on the conservation and sustainable use of biological resources, and on how a fair and equitable sharing of those resources and the benefits that they generate may be achieved and how to develop an adequate system of intellectual property rights for protecting the collective knowledge and innovations of indigenous peoples and their communities as a major social group in biodiversity management, taking into account, inter alia any contribution from the Conference of the Parties to the Convention.

5. Additional proposals for action

101. The United Nations system should develop and strengthen a joint approach to assess the positive and negative impacts of macroeconomic and other global issues that affect biodiversity, such as debt, consumption and production patterns, land-tenure systems, population, multilateral financing, the world trade system and its condition, and economic instruments.

102. Governments should assess existing information systems, including networks, with the aim of establishing communication links among regions for the better exchange of data and the dissemination and management of existing information through, inter alia, electronic mail and the use of remote sensing, so as to facilitate the survey and monitoring of biodiversity.

103. While the biodiversity information base is far from complete and much remains to be learned about biodiversity, there is now adequate scientific basis to begin the formulation and implementation of biodiversity programmes in most countries. Efforts should be made by Governments and the United Nations system, among others, to make full use of existing knowledge and to further improve and increase understanding of the role of biodiversity in sustainable development. Once completed, the global biodiversity assessment of knowledge should yield a useful baseline against which gaps in knowledge could be identified and addressed.

104. The Commission on Sustainable Development may wish to:

(a) Call upon multilateral organizations and intergovernmental and non-governmental organizations to cooperate with Governments in developing a coordinating mechanism to ensure the effective implementation of existing conventions and agreements on biological diversity and the rational use of limited resources;

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(b) Examine ways and means of ensuring that concerted efforts are made to develop common and coherent strategies for the implementation of chapter 15 and related chapters of Agenda 21;

(c) Respond positively to the statement of the Conference of Parties to the Convention on Biological Diversity at its first meeting, with reference to, inter alia, cooperating actively with the Convention, urging widespread ratification of the Convention, encouraging Governments to improve the coordination among their various ministries/departments of chapter 15 and other chapters of Agenda 21, notably chapters 10 to 14, and encouraging the Convention to take the lead, with the support and cooperation of other relevant multilateral, intergovernmental and non-governmental organizations, in coordinating existing relevant agreements at the global and regional levels for the effective implementation of resources;

(d) Encourage a joint approach by the United Nations system in assessing the positive as well as the negative impacts of macroeconomic and other issues related to biodiversity.

Notes

1/ United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

2/ See United Nations Environment Programme, Convention on Biological Diversity (Environmental Law and Institutions Programme Activity Centre), June 1992.

3/ United Nations, Treaty Series, vol. 993, No. 14537, p. 243.

4/ Selected Multilateral Treaties in the Field of the Environment (Nairobi, United Nations Environment Programme, 1982), vol. I, p. 500.

5/ United Nations, Treaty Series, vol. 996, No. 14583, p. 245.

6/ The indicative list is quite extensive and covers (a) technologies and know-how relevant to the identification, characterization and monitoring of ecosystems, species and genetic resources, (b) technologies appropriate for the in situ and ex situ conservation of components of biological diversity and (c) technologies for the sustainable use of biological diversity.

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Annex

UNITED NATIONS SYSTEM ACTIVITIES IN SUPPORT OF CHAPTER 15 OF AGENDA 21 AND THE CONVENTION ON BIOLOGICAL DIVERSITY

1. Management-related activities

1. FAO major programmes on agriculture, fisheries and forestry have a number of objectives and activities that support the conservation and sustainable use of biodiversity by (a) fostering international cooperation and the promotion of national action for the conservation and sustainable use of plant and animal genetic resources, with an emphasis on building national capacity for conservation, evaluation and utilization of these resources for breeding work and related biotechnologies; (b) assessing and developing further the potential of new or underutilized species for agriculture, forestry and fisheries; and (c) encouraging the diversification of production systems and the multiple use of agricultural products and by-products, as an integral part of the maintenance of diversity in rural areas. The main priorities of the programme on natural resources address issues relating to knowledge, the utilization and conservation of biological resources and diversity, the assessment of standing vegetation and its present and potential contribution to agricultural productivity, and the establishment of sustainable farming systems. The programme on crops aims at promoting national capabilities to conserve, enhance and utilize plant genetic diversity through collection, characterization, documentation and the exchange of germ plasm; plant breeding and variety evaluation; plant propagation; international collaboration and information exchange; the development and adoption of modern plant biotechnology in the conservation and improvement of germ plasm; and the promotion of cooperation among interested institutions and laboratories.

2. The FAO Commission on Plant Genetic Resources will harmonize the global system on plant genetic resources with the Convention on Biological Diversity and will work on issues relating to the access to existing germ plasm collections and farmers' rights. The Commission supports international and regional networks on in situ conservation areas; ex situ base collection under the auspices of FAO; the organization of a fourth international technical conference on the conservation and utilization of plant genetic resources; and the establishment of the new global information systems for plant genetic resources and seed exchange based on the ongoing Seed Information System.

3. In the area of livestock genetic resources, FAO in collaboration with UNEP supports the establishment of a comprehensive animal genetic resources programme and the preparation of an updated worldwatch list of domestic animal diversity.

4. The FAO Fisheries Programme supports the conservation and sustainable utilization of biological diversity in high seas, the Exclusive Economic Zones (EEZs), coastal zone ecosystems and inland water courses and wetlands, with the aim of promoting sustainability in world-wide fisheries and the restoration of world resources to levels consistent with the major recommendations of the United Nations Convention on the Law of the Sea and relevant UNCED decisions; strengthening the national capabilities of developing countries for managing

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their fisheries, conserving their aquatic ecosystems and preventing the degradation of their aquatic environments; developing an international code of conduct for responsible fishing, taking into consideration all relevant issues, especially those relating to biological, environmental and technological matters; and promoting the integration of the fishery sector into coastal area management.

5. The FAO programme on forestry, in collaboration with UNEP and other organizations, supports the in situ conservation of forest genetic resources and of natural ecosystems by assessing the state of forest resources and contributing to the sustainable management of wildlife, national parks or other protected areas, with the aim of promoting the sustainable management of forest and tree resources and enhancing their sustained utilization on an environmentally sound basis, while maximizing their contribution to socio-economic development; the conservation of forest ecosystems; and the integration of forests and trees into land-use systems so as to sustain the productivity of land and water resources and the stability of the environment.

6. The main activities of UNESCO involved the conservation and sustainable use of terrestrial and aquatic biodiversity centres around the international network of biosphere reserves (324 reserves in 83 countries, covering more than 211 million hectares, in which research and monitoring activities are conducted and the participation of local communities is systematically promoted); the UNESCO MAB programme; the World Heritage Convention (more than 100 natural sites at present, most of which are inscribed on the World Heritage List for their high biodiversity value); the Coastal Marine Research Programme (focusing on the functioning and sustainable use of coastal marine ecosystems and of their biodiversity); the UNESCO/IUBS/SCOPE Programme Diversitas (focusing on the ecosystems function of biodiversity, specifications and extinctions, and the distributions and dynamics of biodiversity); the WWF/UNESCO Programme on People and Plants (focusing on ethno-botany and the sustainable use of indigenous plants); and the microbiological resources centres (MIRCENs) network. The international network of biosphere reserves, the UNESCO programme on coastal and marine research and the MIRCENs network provide important tools for research and monitoring activities related to biological diversity. Scientific and technical training and capacity-building are fundamental elements of various UNESCO programmes. Under the UNEP/UNESCO International Environmental Education Programme, formal secondary and university-level education, including the subject of biodiversity, is supported. Other initiatives for the conservation of biodiversity include studies on property rights related to access to genetic resources and studies on ecological economics; the creation of a format for species information; the sponsoring of a biodiversity forum for decision makers and scientists; training and technical assistance; and the publication and wide distribution of numerous publications for awareness-building.

7. UNEP works to protect and make sustainable use of individual species and their genetic resources; to conserve the habitats where they can continue to evolve and respond to a changing environment; and to develop appropriate ways of maintaining the maximum genetic diversity for improving agriculture, forestry, health, industry and environment, with a special emphasis on species with an established socio-economic value. UNEP addresses biodiversity conservation and

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sustainable use at various levels: the ecosystems/biogeographic realms level (forests, arid zones, oceans, freshwater etc.); the species level (wildlife); genetic resources level (plant, animal and microbial resources, and natural resources economics); the processes level (biotechnology); the monitoring and assessment level; and the legal level. In collaboration with sister United Nations agencies, UNEP activities on biodiversity focus on the promotion of effective implementation of Agenda 21, the Convention on Biological Diversity and other relevant international conventions; strategies and action plans through technical and scientific back-stopping; the organization of expert meetings; the preparation of reports to respond to specific issues; the provision of secretariats/interim secretariats to biodiversity-related conventions for assisting in developing or strengthening national legislation to implement the conventions; the preparation of regular global biodiversity status reports as a basis for priority action in respect of the potential policy implications of biodiversity conservation and utilization, including resource management options and socio-economic implications; assisting Governments in preparing national biodiversity country studies, strategies and action plans to reinforce the biodiversity assessment and planning processes, in identifying national priorities for action and in providing a baseline for monitoring the effectiveness of action; and, through CITES, assisting Governments in determining the status of endangered species, supporting the preparation of management plans and establishing export quotas for species transferred from appendix I to appendix II of the Convention.

8. UNEP, jointly with IUCN and WRI, released the Global Biodiversity Strategy, which attempts to stimulate and implement action locally, nationally and internationally consistent with the principles, strategic elements and broad agenda for action contained in Agenda 21, the Convention on Biological Diversity and the "Caring for the Earth". The Global Marine Biological Diversity Strategy was also launched jointly with the Centre for Marine Conservation, IUCN and WWF to focus on the threats to life in the sea and ways to save and use it sustainably.

9. Through its various programmes, UNEP supports a wide range of activities aiming at promoting in situ and ex situ conservation of plant, animal and microbial genetic resources and their use for the development of agriculture, forestry and industry, and the development of related global and regional gene banks and information systems; conserving and managing habitats, ecosystems and wildlife in selected representative areas of the world's biogeographic provinces; strengthening and expanding the global network of gene banks housing the world base collections of crop genetic resources (coordinated by IPGRI), the global programme on livestock genetic resources (coordinated by FAO), the LAC and African biodiversity networks, the Biodiversity Information Network (BIN21) the microbiological resources centres (MIRCENs), the international Microbial Strain Data Network (MSDN), the World Data Center on Micro-organisms (WDC) and the global Information Resource on the Release of Organisms into the Environment (IRRO); expanding and improving related professional and institutional capabilities for the assessment and sustainable management of biodiversity, through pilot projects and appropriate training programmes in the conservation of biological diversity and the sustainable use of biological resources and the application of relevant technologies, and through training in the economics of biological resources and environmental law and policy.

UNIDO supports programmes on the industrial utilization of medicinal and aromatic plants, taking into consideration biodiversity conservation concerns. Through its technology advisory services, UNIDO fosters the cooperation among Governments, local communities and the private sector on biodiversity prospecting. The UNIDO ICGEB provides advanced research and training in the area of biotechnology, including the development of innovative tools and technologies for biodiversity conservation and for the sustainable use of genetic resources, and it promotes the application of environmentally sound biotechnologies. In collaboration with UNEP and FAO, UNIDO supports the establishment of regional and global networks on biodiversity and biotechnology to facilitate access to and exchange of information among countries, and to strengthen the development of databases on biodiversity in developing countries.

11. Current and future work of the World Bank in support of the conservation of biological diversity within the framework of the Convention on Biological Diversity and Agenda 21 include: assisting Governments in the preparation and implementation of national environmental action plans, taking into consideration biodiversity concerns, and in the formulation of conservation and development projects; supporting research centres, universities and grass-roots organizations in biodiversity identification and monitoring; strengthening the participation of local communities in the formulation, implementation and monitoring and evaluation of in situ conservation projects, integrating sustainable use practices into Bank loans; supporting research and training programmes on sustainable management systems and interregional research cooperation; strengthening existing mechanisms for information exchange; and promoting the development of traditional and indigenous technologies.

12. IFAD target groups consist of small farmers, indigenous peoples, nomadic pastoralists, artisanal fishermen and other groups who live in the last remaining areas of high biodiversity and are increasingly recognized as key actors in its management. In collaboration with its partners, IFAD is increasingly financing a new generation of projects in developing countries to address the interface between poverty and biodiversity management, with the aim of alleviating poverty, increasing food production and improving nutrition, while conserving biodiversity. In its poverty alleviation projects, IFAD seeks to address such issues as the displacement or loss of land races and wild crop relatives important to small farmers; the optimal use of minor food and medicinal plants; the management of biodiversity by local peoples to ensure that they benefit from its protection; and research and training into specific agro-systems, traditional crops, biological pest control and the socio-economic and technological aspects of sustainable agriculture, particularly in marginal and resource-poor areas that have not been reached by the green revolution.

13. IMO is carrying out an analysis of the implications of Agenda 21 (including chapter 15, "Conservation of biological diversity") for the IMO. Maritime traffic was recognized to have an impact upon marine biodiversity. The IMO work on pollution prevention, the identification of "special areas", particularly "sensitive sea areas" of unique or unusual ecological significance to be avoided by shipping, ships' routing schemes and on ballast water discharges, is expected to make an important contribution to biodiversity conservation.

14. UNCTAD activities on biodiversity are related mainly to the implementation of the Convention on Biological Diversity. The main objective is to contribute to the design and implementation of economic policies and measures ensuring that developing countries attain economic benefits from the full use of the Convention. The main activities centre around its programmes on natural resources management and its impact on the conservation and sustainable use of biological diversity (to ensure that commodity production and trade are consistent with and promote environmentally sound management of natural resources and the conservation and sustainable use of biological diversity); capturing and expanding economic benefits, including through international trade, through the conservation and sustainable use of biological diversity (to assist developing countries in capturing the full value of their biodiversity through the expansion of the production and exports of goods based on natural resources whose production does not induce biodiversity losses); the internalization of costs and resource values linked to biodiversity (to ensure that biological resources are adequately valued); and the access and transfer of technologies related to the conservation and sustainable use of biological diversity.

15. ECA provides advisory services and support to its member States on agriculture and rural development policies, planning and programming, with a focus on measures for the conservation of natural forests and their biodiversity, desertification and the related conservation of biodiversity, the rehabilitation of degraded ecosystems and green belts in targeted countries, and the strengthening of regional cooperation programmes for the optimum and sustainable use of inland and marine fisheries. Within the framework of the African Ministerial Conference on the Environment (AMCEN), ECA supports biodiversity-related activities.

16. A joint ESCWA/FAO study on wildlife protection and development, involving seven ESCWA countries, is being carried out for presentation at the Ministerial Conference on the theme "Management and sustainable development of dry land in the Arab World". Future ESCWA activities will place emphasis on surveying biological resources in the region, developing methodologies for the conservation of biological resources suited to the ecological systems in the region and promoting the formulation of national biodiversity policies and strategies and the improvement of relevant legislation and enforcement measures. However, ESCWA and its member countries require substantive financial resources to implement biodiversity-related activities.

17. A major result of the ECE species conservation programme was its adoption in 1991 of the European Red List of Globally Threatened Animals and Plants. As a follow-up, the senior advisers to ECE Governments on environmental and water problems adopted in 1992 the Code of Practice for the Conservation of Threatened Animals and Plants and other Species of International Significance, which provides comprehensive guidelines to Governments for maintaining biological diversity within their jurisdiction and promoting the conservation of flora and fauna in their habitats.

18. Currently, ECE activities on biological diversity are related to the implementation of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992). The Convention contains

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specific obligations to prevent, control and reduce transboundary impact, including adverse effects on flora and fauna. As a first step, guidelines on the ecosystem approach in water management were adopted in 1993.

19. The Joint FAO/ECE Working Party on Relations between Agriculture and the Environment currently examines various aspects and national practices related to biological diversity and landscape protection as part of its work-plan element entitled Economic, legal, technological and regulatory measures for the promotion of environmentally sustainable agriculture and production of healthy food". A revised synthesis study on this subject was considered in October 1994 with a view to preparing draft recommendations for submission to the ECE Committee on Agriculture and the FAO European Commission on Agriculture.

2. Data and information

20. Decision-making for the protection of biological diversity should be based on adequate and precise biological, socio-economic and environmental data that can be obtained and made available through identification, monitoring and the exchange of information. A current and reliable description of the status of biodiversity and of the processes and activities that have or are likely to have adverse impacts on biodiversity is fundamental to good management and sustainable development. Therefore, the establishment of in-country information networks or other information exchange mechanisms is a necessary component of a country's biodiversity protection. In order to ensure that such information is comparable and transferable, uniform information standards and monitoring methodologies should be established.

21. Up-to-date quantitative and qualitative data gathering and analysis in a systematic and comprehensive manner will underpin all types of activities for biodiversity conservation. Decisions about which ecosystems, species, strains or populations should be conserved should be based on objective criteria, since the blanket conservation of the totality of biological diversity is neither economically feasible nor technically possible. For most countries, this will require the development of analytic tools for enumerating, describing and assessing the status of, trends in, and distribution of their biological diversity; identifying the threats to that diversity; assessing current capacities; collecting socio-economic data useful for evaluating the costs and benefits of conserving and sustainably using those resources; and identifying gaps in knowledge and potential conflicts.

22. Compiling, determining and collating such data will necessitate the development of standard data-collection and harmonized processing methodologies, the production of national inventories and the development of databases, as well as the gathering of new data through research and monitoring as a part of a dynamic process. Such an undertaking will also provide the baseline against which the efforts of nations to implement relevant provisions of Agenda 21 and the Convention on Biological Diversity can be measured, and will enhance the monitoring and assessment capability of countries and the development of indicators for sustainable development. The acquisition, organization and analysis of information as a tool for decision-making must be issue-based and guided by specific objectives.

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23. Perhaps most important in the area of data and information is the steadily increasing pace of the preparation of biodiversity country assessments, strategies and action plans. The primary objective of the country studies programme initiated by UNEP is to assist national Governments to identify, in the light of social, economic, environmental and other objectives, the basic needs and levels of effective conservation, including the rational use of national biological resources and the necessary supportive measures and costs to meet those needs, as well as the benefits associated with the implementation of those measures. The country studies are also expected to (a) provide an overview of the status of biological diversity, in terms of present knowledge, conservation efforts and future conservation needs and costs; (b) institutionalize national biodiversity conservation strategies and action plans to be carried out in concert with national, regional and international institutions, and within the framework of Agenda 21 and the Convention on Biological Diversity; (c) provide a basis for establishing priority areas of biological diversity conservation, and for national environmental planning and resource use; (d) identify or develop techniques and methodologies for estimating the costs and benefits of the conservation of biological diversity; (e) enhance the national capacity to assess the direct and indirect benefits, investment costs and basic funding needs of biodiversity conservation and its rational use; (f) develop understanding among decision makers, educators, economists, social scientists and the general public of the importance of safeguarding biological diversity, and engage their support in this area; and (g) secure additional parties to the Convention on Biological Diversity, and promote the effective implementation of other biodiversity-related international and regional agreements and action plans.

24. As a major contribution to mobilizing the scientific community to help provide a solid basis for further decision-making and follow-up to the Convention on Biological Diversity and Agenda 21, UNEP initiated the Global Biodiversity Assessment, with funding from GEF, with the aim of providing an independent, critical, peer-reviewed scientific analysis of the current issues, theories and views regarding the main global aspects of biodiversity. The assessment will serve as a basis for decision-making to meet the objectives of the Convention on Biological Diversity and Agenda 21; it will also be an important tool for the scientific body of the Convention. The potential audience of the Assessment is large and includes international, regional and national environmental organizations, both governmental and non-governmental, as well as policy makers and scientists working in the field of biodiversity. The main text of the Assessment and a policy maker's summary is expected to be ready by the second half of 1995.

25. To improve the availability of reliable up-to-date information to support biodiversity planning and management in developing countries, UNEP, with support from GEF, launched a project to assist developing countries and the economies in transition in building their information capabilities and in transferring appropriate technologies and skills in information management to organize, maintain and use data generated under the country studies process.

26. The interim secretariat of the Convention on Biological Diversity is compiling a list of databases of relevance to the Convention, identifying their gaps and linkages. A catalogue will be prepared, updated regularly and widely

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distributed. A similar activity was initiated to compile information on scientific programmes and international cooperation.

27. In addition, FAO in collaboration with UNEP supported the establishment of global and regional data banks on livestock and poultry genetic resources; a coastal resource atlas was produced using GIS as a management tool for coastal regions (UNEP); the establishment of the Global Biodiversity Information Network (BIN21) was initiated (UNEP/Tropical Database, Brazil); and the first edition of the World Watch List for Domestic Animal Diversity and four volumes of the bulletin Animal Genetic Resources Information were released (FAO/UNEP).

28. UNESCO is developing its own electronic network and information service on biosphere reserves and ecological sciences (MABNet), as well as its own database on national and cultural world heritage sites.

29. WCMC continued to compile and update substantial databases on habitats and threatened animals and plants for the red data books and biodiversity status reports that it publishes. WMO, through its Agricultural Meteorology Programme, assists its members in improving their capabilities in the application of meteorological and climatological information to agricultural production (food, forestry and fisheries), and thus contributes to the conservation and use of biodiversity, especially in marginal and severe climatic conditions.

30. WMO, jointly with FAO and recently with UNEP, organized practical on-the-spot training using mini or hand-held computers on the application of agro-meteorological data and information for effective planning and management of water for sustainable irrigated crop production. WMO also organized jointly with EPPO and NAPPO symposia and workshops to give practical training in the use of meteorological data in the fight against pest and diseases, in reducing the level of undesired chemicals and in improving the quality of agricultural produce. Activities to counter locust swarms have been expanded to include case studies on the successful use of meteorological data in desert locust control. Efforts are being made to create monitoring operations through the acquisition and installation of equipment for meteorological observations, including remote sensing and collaboration with PRIFAs. A publication on the application of agro-meteorological information for desert locusts control has been issued. WMO has also been participating in a number of activities to promote the use of meteorological and hydrological information to protect forests and desert-land ecosystems and thus contribute to the conservation of biodiversity.

31. Drought and desertification are serious threats to many species, especially in dry and semi-arid areas. As a contribution to the conservation of these threatened species, WMO, in collaboration with UNEP, prepared a comprehensive report entitled "Interactions of desertification and climate", which was one of the many inputs made by WMO to the negotiating process of the Convention on Biological Diversity. The report is being published as a joint WMO/UNEP publication.

32. WMO, in cooperation with the University of Nebraska, held training seminars on drought analyses and on drought assessment, preparedness and management in Africa and Latin America.

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3. International and regional cooperation and coordination

33. If the world's biodiversity is to be monitored, conserved and used in a sustainable way, international and regional cooperation as a means of linking and sharing experience and information is essential. This was envisaged in chapter 15 of Agenda 21, which calls for the promotion of cooperation between the parties to relevant international conventions and action plans with the aim of strengthening and coordinating efforts to conserve biodiversity and the sustainable use of biological resources (para. 15.7 (e)), as well as the promotion of improved international coordination of measures for conserving and managing endangered/non-pest migratory species (para. 15.7 (g)). A number of programmes are under way, as follows:

(a) A number of relevant global networks are being established/ strengthened for enhancing global access to biodiversity information, including the Biodiversity Information Network (BIN21), MSDN, BINAS and IRRO;

(b) The Convention on Biological Diversity is expected to support the establishment or strengthening of networks for technical and scientific cooperation, and capacity-building for the implementation of the provisions of the Convention.

34. Within the biodiversity country studies framework, countries are being assisted in the development of baseline surveys and inventories of national biodiversity (UNEP), the development of economic tools to determine costs, and benefits of biodiversity conservation and their distribution (UNEP).

35. FAO, UNEP, UNESCO, IPGRI and others support regional and global programmes for the surveying, collection, evaluation and conservation of animal, plant and microbial genetic resources, and training in relevant fields.

36. The following systems and programmes are already operational: global networks of gene banks housing the world base collection of crop genetic resources (CGIAR/IPGRI/FAO); regional MIRCENs (UNEP, UNESCO); UNESCO-MAB/GEF protected areas network for biodiversity conservation in central Europe; the Northern Sciences Network (UNESCO-MAB); Global Ocean Ecosystem Dynamics (UNESCO); the South-South Cooperation Programme for the Conservation of Tropical Ecosystems (UNESCO/UNU); the China Biosphere Reserves Network (UNESCO-MAB); marine laboratory networks (UNESCO); and the international environmental education programme (UNEP/UNESCO).

37. The Environmental Action Programme for Central and Eastern European Countries was adopted by the European Ministers of the Environment (Lucerne, Switzerland, 1993); the Programme includes a chapter on the conservation of biological diversity.

38. The Second Ministerial Conference on the Protection of Forests in Europe (Helsinki, 1993) adopted guidelines for the conservation of the biodiversity of European forests.

39. Following the adoption of resolution 2 at the Ministerial Conference for the Protection of Forests in Europe (Strasbourg, France, 1990) and its

endorsement at the Second Ministerial Conference (Helsinki, 1993), IPGRI and FAO have jointly developed the European Forest Genetic Resources Programme (EUFORGEN).

40. CGIAR, which has traditionally focused on crop genetic resources, decided in 1991 to expand its mandate to include forestry and agro-forestry. As part of this resource, the Centre for International Forestry Research (CIPOR), based in Bogor, Indonesia, focuses on natural ecosystems and their management, as well as plantations; the International Centre for Research in Agro-Forestry (ICRAF), based in Nairobi, looks at the role of agro-forestry and specifically at the adoption of multipurpose trees in sustainable farming systems; and the International Plant Genetic Resources Institute (IPGRI), based in Rome, concentrates on the conservation and utilization of the genetic resources of agricultural crops and forest tree species.

41. The Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats was adopted in Bern, Switzerland, on 19 September 1979 and entered into force in 1982. The European Union Habitat Directive on the Conservation of Natural Habitats and Wild Fauna and Flora entered into force in 1994.

42. The Lucerne Declaration of 30 April 1993 adopted by the Second Pan-European Ministerial Conference on the theme "Environment for Europe" contains a section on the conservation of biodiversity. The Maastricht Declaration of 12 November 1993 of the Conference, entitled "Conserving Europe's natural heritage: towards a European ecological network", considers the development of a European biological and landscape diversity strategy.

43. The Monaco Declaration, entitled "The Role of the Bern Convention in the Implementation of Worldwide International Instruments for the Protection of Biodiversity", was adopted on 28 September 1994 by the Intergovernmental Symposium on the theme "UNCED, the Convention on Biological Diversity and the Bern Convention: the next steps". The participants acknowledged that regional international organizations should act to favour the application of world wide international instruments for the protection of biodiversity, in particular the Convention on Biological Diversity, the Rio Declaration on Environment and Development, the Non-legally Binding Authoritative Statement of Principles Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests, and Agenda 21. They also acknowledged that the Council of Europe has a fundamental role to play in the implementation at the regional level of principles and obligations adopted on a global level, and that the Bern Convention constitutes an instrument of major importance for the conservation of biological diversity at the regional level by reasons of its objectives and its geographical coverage. Several recommendations on the scientific, technical, strategic and financial aspects of the question were adopted within this framework by the participants.

44. The following regional meetings were organized with UNEP support to promote the implementation of the Convention on Biological Diversity: the ASEAN countries' Conference on the Convention on Biological Diversity and the Bangalore Declaration (1994); the African Ministerial Conference on the Convention on Biological Diversity (1994); the Baltic States Meeting on the

Convention on Biological Diversity (1994); and workshops on the Convention on Biological Diversity in Latin America and the Caribbean (1994).

45. The following activities are under way: the production of an eastern African coastal and marine environment database and atlas (UNEP); the protection of East African Biodiversity (FAO/UNEP); the creation of global terrestrial observing systems (FAO, ICSU, UNEP, UNESCO, WMO); the conservation of critical coral reef habitats in the Red Sea (UNEP-GEF); the creation of a regional activity centre for the protection of biodiversity/Black Sea action plan (UNEP-GEF); and the protection of the marine biodiversity of the Caspian Sea (UNEP-GEF).

46. Action plans for the management of the Mediterranean Monk Seal and the conservation of Mediterranean cetaceans and marine turtles have been initiated by UNEP.
